GROUP 11A

ENGINE MECHANICAL <4A9>

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GENERAL INFORMATION

M1111000100992

Item		4A91
Total displacement mL		1,499
Bore × Stroke mm		75.0 × 84.8
Compression ratio		10.0
Compression chamber		Pentroof
Camshaft arrangement		DOHC
Number of valve	Intake	8
	Exhaust	8
Valve timing	Intake opening	BTDC 31° – ATDC 19°
	Intake closing	ABDC 21° – ABDC 71°
	Exhaust opening	BBDC 39°
	Exhaust closing	ATDC 5°
Fuel system		Electronically controlled multipoint fuel injection
Rocker arm		Not equipped
Auto-lash adjuster		Not equipped

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SERVICE SPECIFICATIONS

M1112000300676

Item		Standard value	Limit
Alternator and A/C drive belt tension (When checked)	Vibration frequency Hz	202 – 247	–
	Tension N	392 – 588	–
	Deflection mm (Reference)	6.8 – 9.0	–
Alternator and A/C drive belt tension (When adjusted)	Vibration frequency Hz	214 – 237	–
	Tension N	441 – 539	–
	Deflection mm (Reference)	7.3 – 8.3	–
Alternator and A/C drive belt tension (When replaced)	Vibration frequency Hz	286 – 319	–
	Tension N	784 – 980	–
	Deflection mm (Reference)	4.4 – 5.4	–
Basic ignition timing		5° BTDC ± 3°	–
Ignition timing		Approximately 10° BTDC	–
Idle speed r/min		700 ± 50	–
CO contents %		0.1 or less	–
HC contents ppm		100 or less	–
Valve clearance (at cold) mm	Intake valve	0.22 ± 0.04	–
	Exhaust valve	0.30 ± 0.04	–
Compression pressure (at engine speed of 300 r/min) kPa		1,200	Minimum 850
Compression pressure difference of all cylinders kPa		–	Maximum 98
Intake manifold vacuum kPa		–	Minimum 60

SEALANTS

M1112000500766

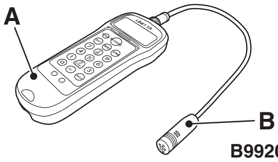
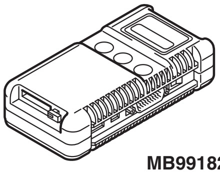
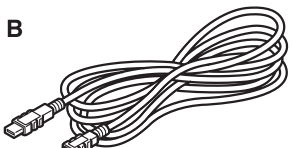
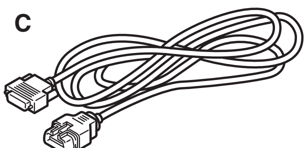
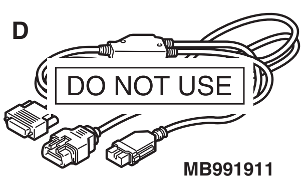
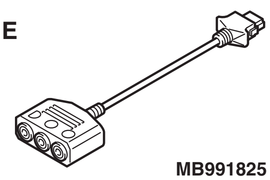
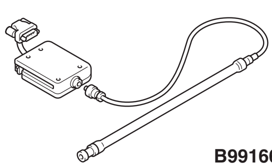
Item	Specified Sealant	Remark
Timing chain tensioner cover	LOCTITE 5971 or exact equivalent	Semi-drying sealant
Cylinder head cover assembly		
Engine oil pan		
Crankshaft rear oil seal case assembly		
Flywheel bolt <M/T>	LOCTITE 2701 or equivalent	
Drive plate bolt <CVT>		

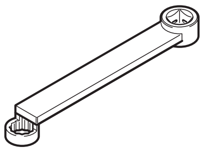
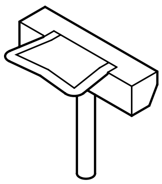
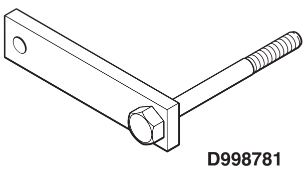
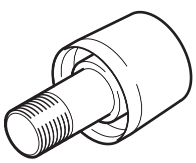
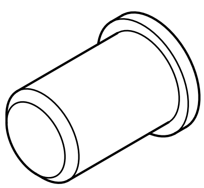
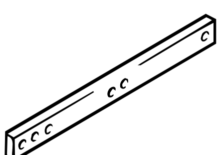
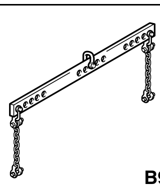
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SPECIAL TOOLS

M1112000601164

Tool	Number	Name	Use
 B992080	MB992080 A: MB992081 B: MB992082	Belt tension meter set A: Belt tension meter B: Microphone assembly	Drive belt tension check
A  MB991824 B  MB991827 C  MB991910 D  MB991911 E  MB991825 F  MB991826 MB991955	MB991955 A: MB991824 B: MB991827 C: MB991910 D: MB991911 E: MB991825 F: MB991826	M.U.T.-III sub assembly A: Vehicle communication interface (V. C. I.) B: M.U.T.-III USB cable C: M.U.T.-III main harness A (Vehicles with CAN communication system) D: M.U.T.-III main harness B (Vehicles without CAN communication system) E: M.U.T.-III adapter harness F: M.U.T.-III trigger harness	⚠ CAUTION **For vehicles with CAN communication, use M.U.T.-III main harness A to send simulated vehicle speed. If you connect M.U.T.-III main harness B instead, the CAN communication does not function correctly.** • Drive belt tension check • Checking the ignition timing • Checking the idle speed
 B991668	MB991668	Belt tension meter set	Drive belt tension check (used together with V.C.I.)

Tool	Number	Name	Use
 B991992	MB991992	Torque wrench adapter	Removal and installation of V.V.T. sprocket assembly mounting bolt
 D998727	MD998727	Oil pan FIPG cutter	Engine oil pan removal
 D998781	MD998781	Flywheel stopper	• Supporting the flywheel assembly <M/T> • Supporting the drive plate assembly <CVT>
 B991993	MB991993	Crankshaft front oil seal guide	Crankshaft front oil seal installation
	MB990699	Differential oil seal installer	
 B991527	MB991527	Engine hanger	Supporting the engine and transmission assembly For the engine hanger balancer (MB991454), use a chain only. *NOTE: Special tool MB991454 is a part of engine hanger attachment set MB991453.*
 B991454	MB991454	Engine hanger balancer	

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ON-VEHICLE SERVICE

DRIVE BELT TENSION CHECK AND ADJUSTMENT

M1111003101433

ALTERNATOR AND A/C DRIVE BELT TENSION CHECK

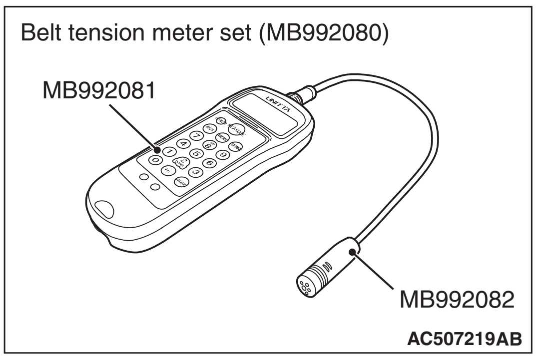
Check the drive belt tension in the following procedure.

Standard value:

Item	When checked	When adjusted	When replaced
Vibration frequency Hz	202 – 247	214 – 237	286 – 319
Tension N	392 – 588	441 – 539	784 – 980
Deflection mm (Reference)	6.8 – 9.0	7.3 – 8.3	4.4 – 5.4

<When the vibration frequency is measured {Special tool (MB992080) is used}: Recommendation>

NOTE: The vibration frequency measuring method is recommended for check and adjustment of the drive belt tension.



1. Connect the Special tool microphone assembly (MB992082) to the Special tool belt tension meter (MB992081) of the Special tool belt tension meter set (MB992080).
2. Press the "POWER" button to turn on the power supply.
3. Press number key 1. Check to ensure that "No. 01" appears on the upper left of the display and that the following numeric values are displayed for individual items (M, W, and S):

   M 000.9 g/m

   W 010.0 mm/R

   S 0100 mm

   If numeric values have not been entered (new tool), set them according to the belt specifications as shown below. Once you set them, you do not have to set them again. The settings remain undeleted even after battery replacement.

   NOTE: This operation is to temporarily set the preset data such as the belt specifications, because if the measurement is taken without input of the belt specifications, conversion to tension value (N) cannot be made, resulting in judgement of error.

   <Setting procedure>

   (1) Press down the "MASS" button till the belt mass select display appears.

   (2) Press the "UP" or "DOWN" button to select "01 1.5GT 0.9" and press the "MEASURE" button to decide it.
   Check to ensure that "M 000.9 g/m" is displayed.

   (3) Press the "WIDTH" button to change to the belt width input display.

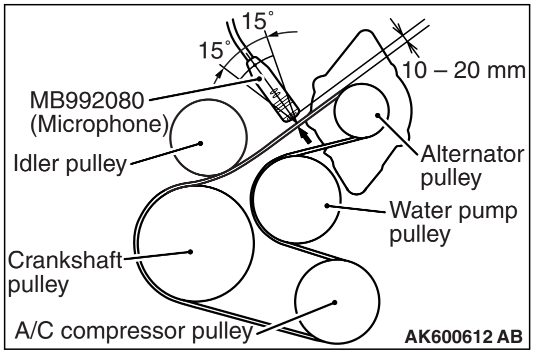
   (4) Press number keys 0, 1, 0, and 0 sequentially, and press the "SELECT" button to apply them. Check to ensure that "W 010.0 mm/R" appears on the display.

   (5) Press the "SPAN" button to change to the span length input display.

   (6) Press number keys 0, 1, 0, and 0 sequentially, and press the "SELECT" button to apply them. Check to ensure that "S 0100 mm" appears on the display.
4. Press "Hz" button twice to change the display to the frequency display (Hz).

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⚠ CAUTION



The temperature of the surface of the belt should be as close as possible to normal temperature.

- **Do not let any contaminants such as water or oil get onto the microphone.**
- **If strong gusts of wind blow against the microphone or if there is loud sources of noise nearby, the values measured by the microphone may not correspond to actual values.**
- **If the microphone is touching the belt while the measurement is being made, the values measured by the microphone may not correspond to actual values.**
- **Do not take the measurement while the vehicle's engine is running.**

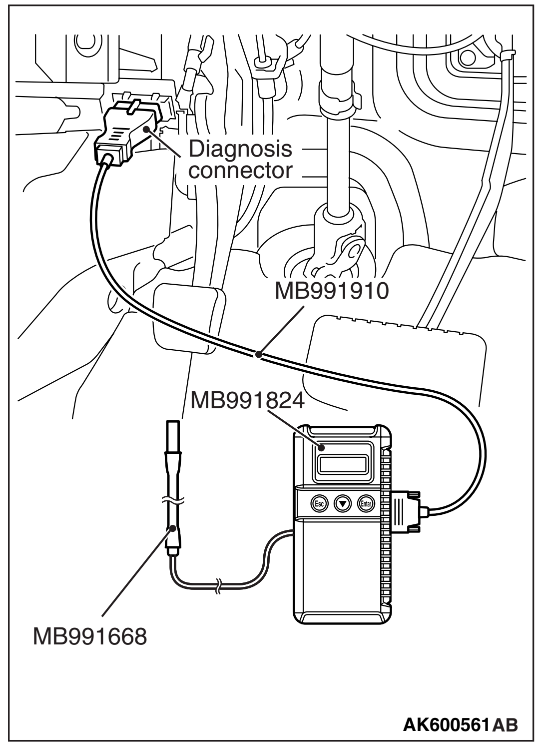
5. Hold the microphone to the middle of the drive belt between the pulleys (at the place indicated by the arrow), about 10 – 15 mm away from the rear surface of the belt and so that it is perpendicular to the belt (within an angle of ± 15 °).
6. Press the "MEASURE" button.
7. Gently tap the middle of the belt between the pulleys (the place indicated by the arrow) with your finger as shown in the illustration, and check that the vibration frequency of the belt is within the standard value.

   NOTE: To take the measurement repeatedly, fillip the belt again.
8. After the completion of the measurement, press and hold the "POWER" button to turn off the power supply.

<When the vibration frequency is measured vehicle communication interface (V.C.I.) is used: Recommendation>

NOTE: The vibration frequency measuring method is recommended for check and adjustment of the drive belt tension.

⚠ CAUTION



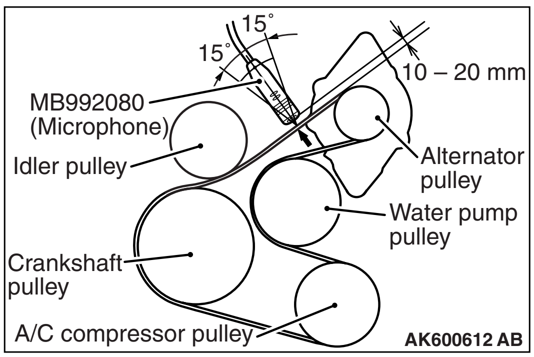
To prevent damage to special tool V.C.I. (MB991824), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting special tool V.C.I. (MB991824).

1. Connect the special tool belt tension meter set (MB991668) to the special tool V.C.I (MB991824).
2. Connect special tool M.U.T.-III main harness A (MB991910) to special tool V.C.I. (MB991824).
3. Connect special tool M.U.T.-III main harness A (MB991910) to the diagnosis connector.
4. Turn the ignition switch to the "ON" position and select "Belt Tension Measurement" from the menu screen.

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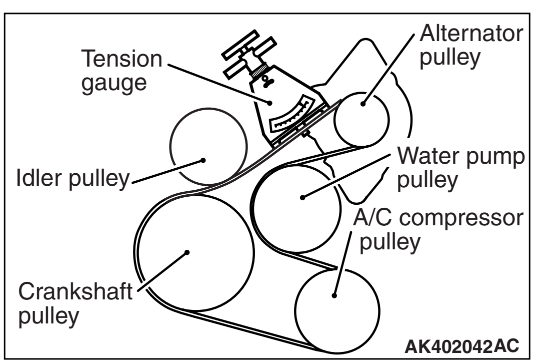
⚠ CAUTION

- **The temperature of the surface of the belt should be as close as possible to normal temperature.**
- **Do not let any contaminants such as water or oil get onto the microphone.**
- **If strong gusts of wind blow against the microphone or if there is loud sources of noise nearby, the values measured by the microphone may not correspond to actual values.**
- **If the microphone is touching the belt while the measurement is being made, the values measured by the microphone may not correspond to actual values.**
- **Do not take the measurement while the vehicle's engine is running.**



5. Hold the microphone to the middle of the drive belt between the pulleys (at the place indicated by the arrow), about 10 – 20 mm away from the rear surface of the belt and so that it is perpendicular to the belt (within an angle of ± 15 °).
6. Gently tap the middle of the belt between the pulleys (the place indicated by the arrow) with your finger as shown in the illustration, and check that the vibration frequency of the belt is within the standard value.

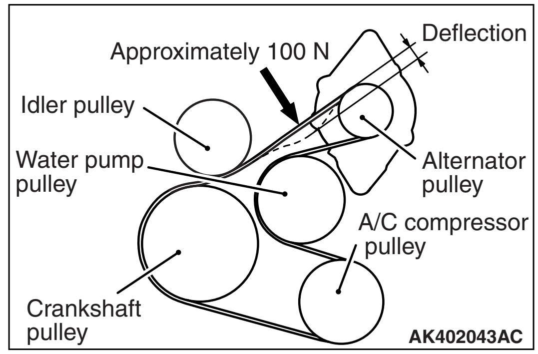
<When using the tension gauge>



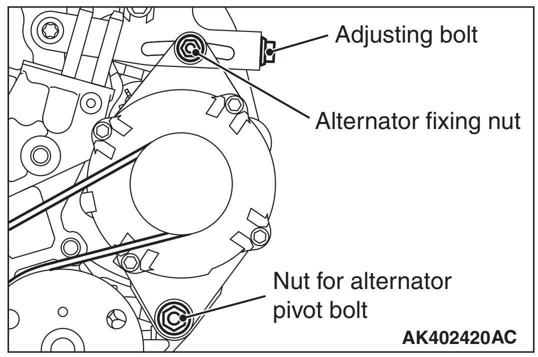
Use a belt tension gauge to check that the belt tension is within the standard value.

NOTE: Before inspection, remove the oil level gauge guide.

<Belt deflection check>



Apply approx. 100 N of force to the middle of the drive belt between the pulleys (at the place indicated by the arrow) and check that the amount of deflection is within the standard value.



If not within the standard value, adjust the belt tension by the following procedure.

1. Loosen the nut of the nut for alternator pivot bolt.
2. Loosen the alternator fixing nut.
3. Use the adjusting bolt to adjust the belt tension and belt deflection to the standard values.
4. Tighten the nut of the nut for alternator pivot bolt.

   Tightening torque: 47 ± 5 N·m
5. Tighten the alternator fixing nut.

   Tightening torque: 23 ± 2 N·m
6. Tighten the adjusting bolt.

   Tightening torque: 5.0 ± 1.0 N·m

⚠ CAUTION

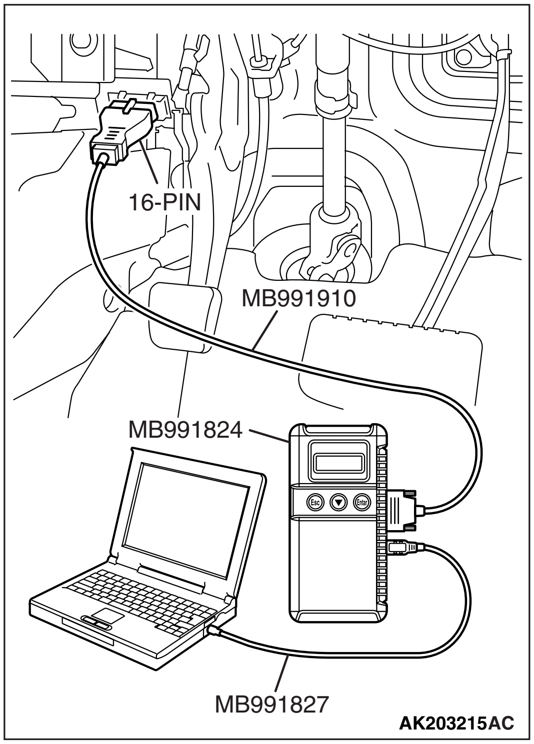
When checking the belt tension, turn the crankshaft clockwise one turn or more.

7. Check the belt tension, and readjust if necessary.
8. When the belt tension is adjusted by measuring the deflection, adjust it with a tool for vibration frequency measurement or tension measurement afterward.

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IGNITION TIMING CHECK

M1111001701428



1. Before inspection, set the vehicle to the pre-inspection condition.
2. Turn the ignition switch to the "LOCK" (OFF) position and then connect the M.U.T.-III to the diagnosis connector.
3. Set the timing light to the power supply line (terminal No.1) of the ignition coil No.1.
4. Start the engine and let it run at idle.
5. Select item No. 22 on the M.U.T.-III to measure engine idle speed and check that it is approximately 700 r/min.
6. Select No. 17 of the M.U.T.-III Actuator test.
7. Check that basic ignition timing is within the standard value.

   Standard value: 5° BTDC ± 3°

8. If the basic ignition timing is outside the standard value, inspect the MPI system (Refer to GROUP 13A – Troubleshooting – Inspection chart for diagnosis code P.13A-20).

⚠ CAUTION

If the test is not cancelled, a forced driving will continue for 27 minutes. Driving under this condition may damage the engine.

9. Press the M.U.T.-III clear key (Select a forced driving cancel mode) to release the Actuator test.
10. Check that ignition timing is at the standard value.

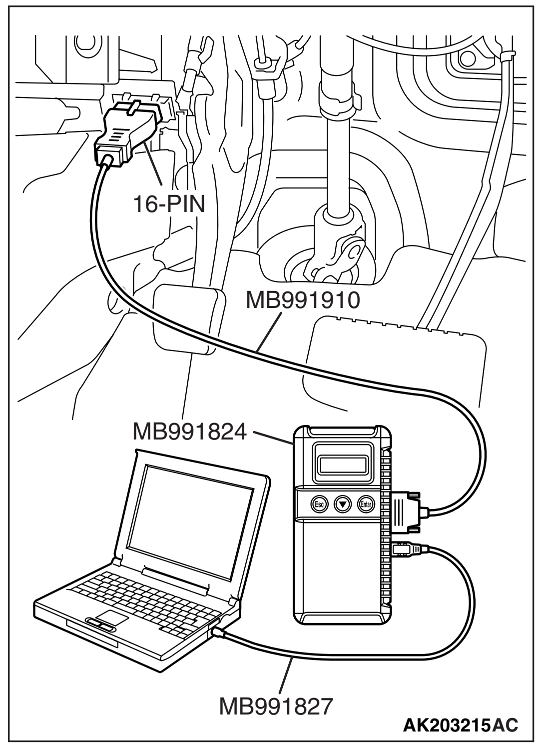
    Standard value: approximately 10° BTDC

    NOTE:
    - *The ignition timing may fluctuate within ± 7° BTDC. This is normal.*
    - *In higher altitude, the ignition timing is more advanced than the standard value by approximately 5°.*

11. Remove the timing light.
12. Turn off the ignition switch and then remove the M.U.T.-III.

IDLE SPEED CHECK

M1111003501293



1. Before inspection, set the vehicle to the pre-inspection condition.
2. Turn the ignition switch to "LOCK" (OFF) position.
3. Connect the M.U.T.-III to the diagnosis connector.
4. Set the timing light to the power supply line (terminal No.1) of the ignition coil No.1.
5. Start the engine and let it run at idle.
6. Check that ignition timing is at the standard value.

   Standard value: approximately 10° BTDC

7. Check the idle speed.

   Standard value: 700 ± 50 r/min

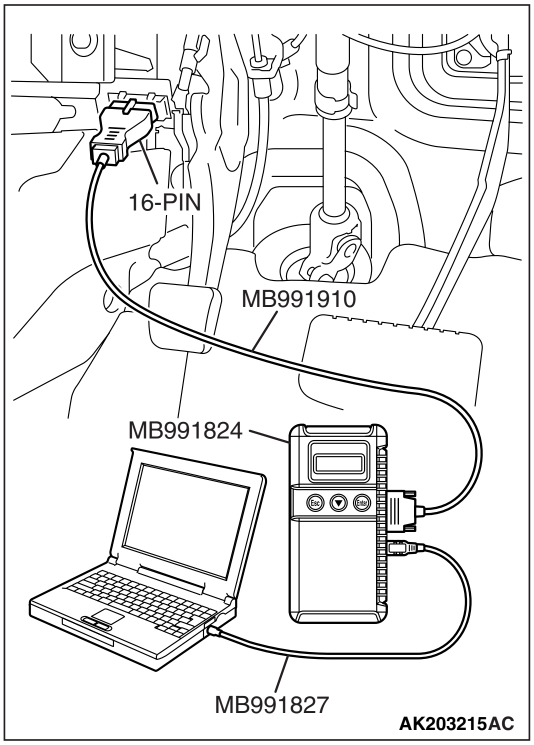
   NOTE:
   - *The idle speed is controlled automatically by the idle speed control system.*
   - *When using the M.U.T.-III, select item No. 22 and take a reading of the idle speed.*

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8. If the idle speed is outside the standard value, inspect the MPI system (Refer to GROUP 13A – Troubleshooting – Inspection chart for diagnosis code P.13A-20).

IDLE MIXTURE CHECK

M1111002100965



1. Before inspection, set the vehicle to the pre-inspection condition.
2. Turn the ignition switch to "LOCK" (OFF) position.
3. Connect the M.U.T.-III to the diagnosis connector.
4. Set the timing light to the power supply line (terminal No.1) of the ignition coil No.1.
5. Start the engine and let it run at idle.
6. Check that ignition timing is at the standard value.

   Standard value: approximately 10° BTDC

7. Run the engine at 2,500 r/min for 2 minutes.
8. Set the CO, HC tester.
9. Check the CO contents and the HC contents at idle.

   Standard value
   CO contents: 0.1 % or less
   HC contents: 100 ppm or less

10. If there is a deviation from the standard value, inspect the MPI system (Refer to GROUP 13A – Troubleshooting – Inspection chart diagnosis code P.13A-20)

VALVE CLEARANCE CHECK AND ADJUSTMENT

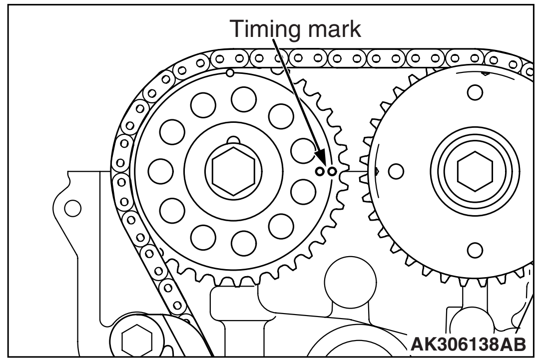
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NOTE: Perform the valve clearance check and adjustment at the engine cold state.

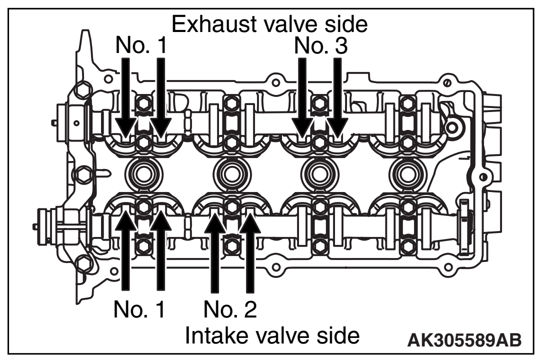
1. Remove all ignition coils.
2. Remove the cylinder head cover.

⚠ CAUTION

Turn the crankshaft always clockwise.



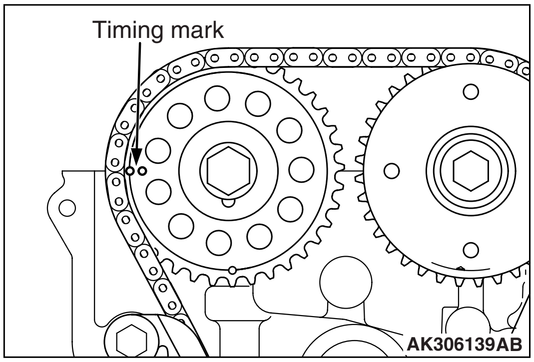
3. Turn the crankshaft clockwise, and align the timing mark on the exhaust camshaft sprocket against the upper face of the cylinder head as shown in Figure. Therefore, No.1 cylinder goes to the compression top dead centre.



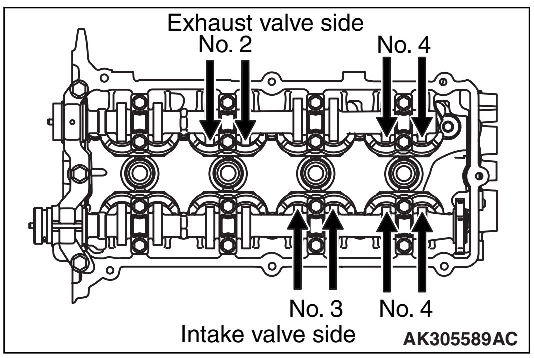
4. Using a thickness gauge, measure the valve clearance with the arrow shown in Figure. If deviated from the standard value, make note for the valve clearance.

   Standard value:
   Intake valve 0.22 ± 0.04 mm
   Exhaust valve 0.30 ± 0.04 mm

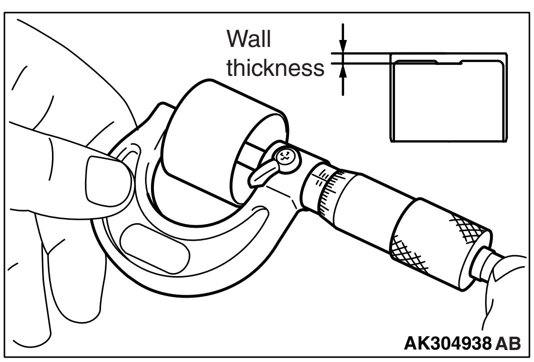
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5. Turn the crankshaft clockwise 360 degrees, and put the timing mark on the exhaust camshaft sprocket in position shown in Figure. Therefore, No.4 cylinder goes to the compression top dead centre.



6. Check the valve clearance with the arrow shown in Figure. In the same procedure as 4.
7. If the valve clearance is deviated from the standard value, remove the camshaft and the valve tappet. For the camshaft removal, refer to Camshaft Removal and Installation P.11A-17 .



8. Using a micrometer, measure the thickness of the removed valve tappet.
9. Calculate the thickness of the newly installed valve tappet through the following equation.

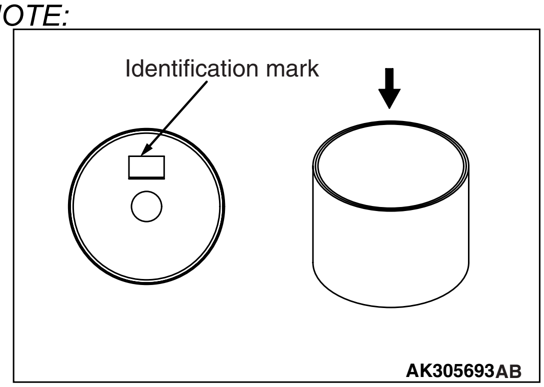
   A: thickness of newly installed valve tappet

   B: thickness of removed valve tappet

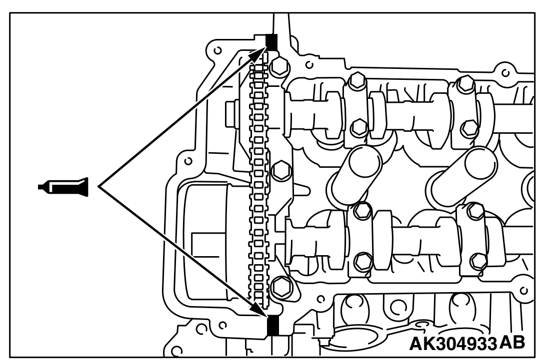
   C: measured valve clearance

   Equation
   Intake valve: A = B + (C − 0.22 mm)
   Exhaust valve: A = B + (C − 0.30 mm)

   NOTE:



   The valve tappet ranges 2.70 − 3.30 mm and has 31 types per 0.02 mm. The thickness below a decimal point is stamped on the reverse side of the valve tappet.
   Example: In case of 2.90 mm, "90" is stamped.
10. Install the valve tappet selected through the procedure 10, and put the camshaft in position. For the camshaft installation, refer to Camshaft Removal and Installation P.11A-17 .
11. Remove any liquid gasket remaining on the cylinder head cover, the timing chain case and the cylinder head.

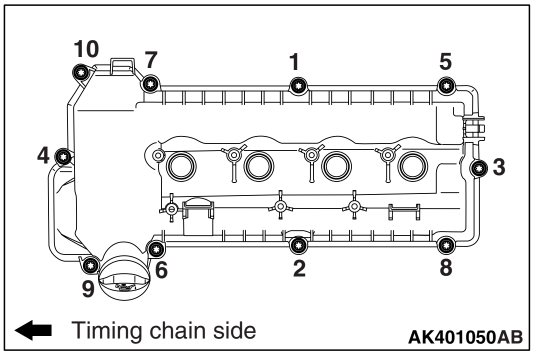


⚠ CAUTION
The cylinder head cover should be installed within 3 minutes of applying liquid gasket.

12. Apply a 4 mm bead of liquid gasket as illustrated.

   Specified sealant:
   LOCTITE 5971 or exact equivalent

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13. Install the cylinder head cover and in accordance with the procedure shown in Figure, tighten the bolt of the cylinder head cover.

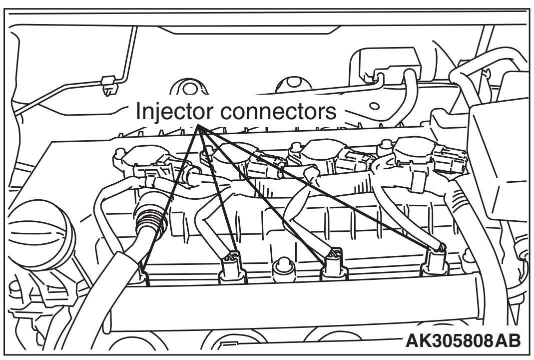
    Tightening torque: 9.0 ± 1.0 N·m

14. Install the ignition coils.

COMPRESSION PRESSURE CHECK

M1111002601491

1. Before inspection, set the vehicle to the pre-inspection condition.
2. Remove all of the ignition coils and spark plugs.

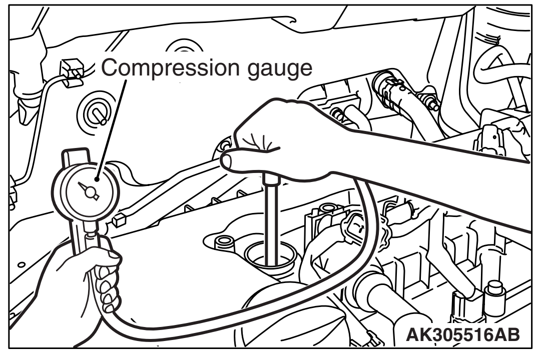


3. Disconnect the all of the injector connectors.

⚠ CAUTION

- **Keep away from the spark plug hole when cranking.**
- **If compression is measured with water, oil, fuel, etc., that has come from cracks inside the cylinder, these materials will become heated and will gush out from the spark plug hole, which is dangerous.**

4. Cover the spark plug hole with a shop towel etc., and after the engine has been cranked, check that no foreign material is adhering to the shop towel.



5. Set compression gauge to one of the spark plug holes.
6. Crank the engine with the throttle valve fully open and measure the compression pressure.

   Standard value (at engine speed of 300 r/min): 1,200 kPa
   Limit (at engine speed of 300 r/min): Minimum 850 kPa

7. Measure the compression pressure for all the cylinders, and check that the pressure differences of the cylinders are below the limit.

   Limit: Maximum 98 kPa

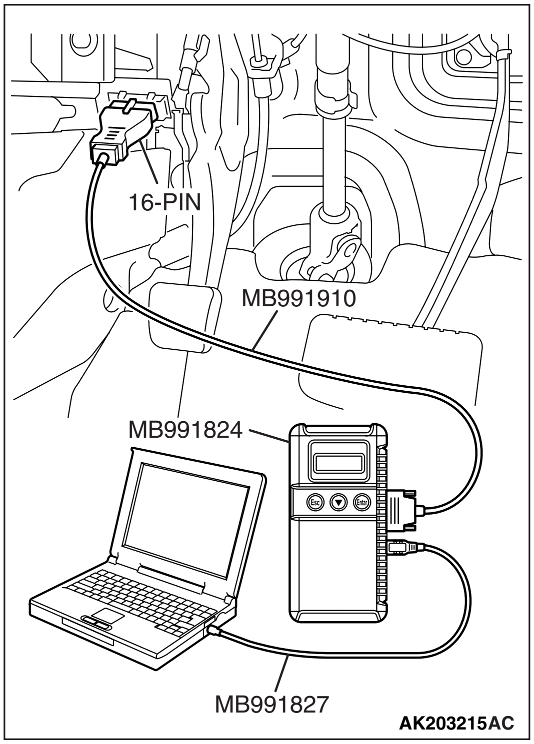
8. If there is a cylinder with compression or a compression difference that is outside the limit, pour a small amount of engine oil through the spark plug hole, and repeat the operations in steps from 5 to 7.
   (1) If the compression increases after oil is added, the cause of the malfunction is a worn or damaged piston ring and/or cylinder inner surface.
   (2) If the compression dose not rise after oil is added, the cause is a burnt or defective valve seat, or pressure is leaking from the gasket.
9. Connect the crank angle sensor connector.
10. Install the spark plugs and spark plug cables.
11. Use the M.U.T.-III to erase the diagnosis codes.

    NOTE: This will erase the diagnosis code resulting from the injector connectors being disconnected.

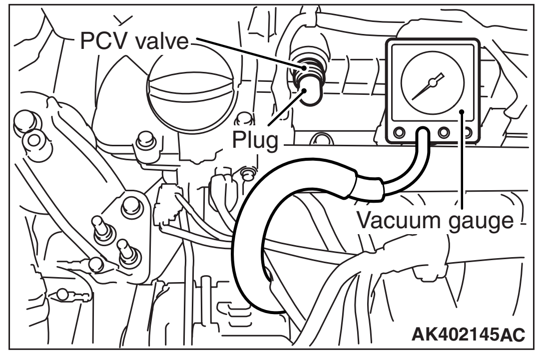
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MANIFOLD VACUUM CHECK

M1111002701119



1. Before inspection, set the vehicle to the pre-inspection condition.
2. Turn the ignition switch to "LOCK" (OFF) position.
3. Connect the M.U.T.-III to the diagnosis connector.



4. Disconnect the ventilation hose from the positive crankcase ventilation (PVC) valve, and then connect a vacuum gauge to the ventilation hose. Plug the positive crankcase ventilation (PCV) valve.
5. Start the engine and check that idle speed is approximately 700 r/min.
6. Check the intake manifold vacuum.

   Limit: Minimum 60 kPa

7. Turn off the ignition switch.
8. Remove the vacuum gauge and then connect the ventilation hose to the positive crankcase ventilation (PCV) valve.
9. Remove the M.U.T.-III.

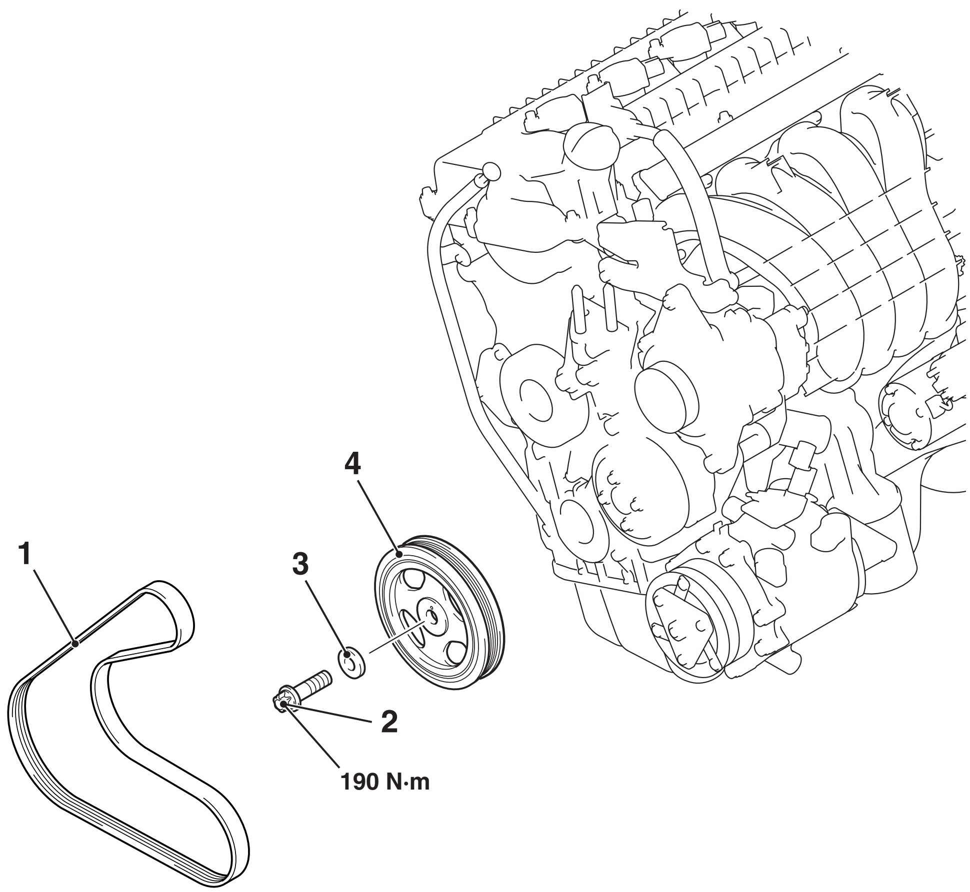
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CRANKSHAFT PULLEY

REMOVAL AND INSTALLATION

M1112001601060

Pre-removal Operation	Post-installation Operation
• Front Under Cover Panel Assembly Removal (Refer to GROUP 51, Front Bumper Assembly and Radiator Grille P.51-2). • Engine Room Side Under Cover (RH) Removal	• Drive Belt Tension Check and Adjustment (Refer to P.11A-6). • Engine Room Side Under Cover (RH) Installation • Front Under Cover Panel Assembly Installation (Refer to GROUP 51, Front Bumper Assembly and Radiator Grille P.51-2).



Removal steps

<<**A**>> 1. Drive belt

<<**B**>> >>**A**<< 2. Crankshaft pulley bolt

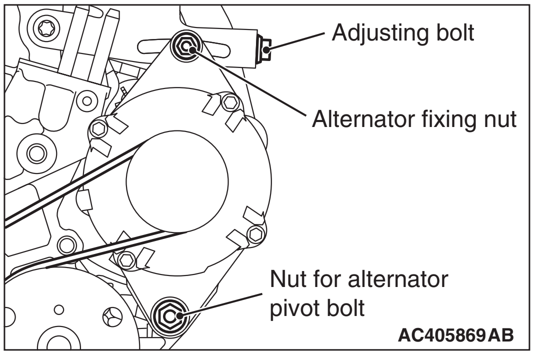
Removal steps (Continued)

>>**A**<< 3. Crankshaft pulley washer

>>**A**<< 4. Crankshaft damper pulley

REMOVAL SERVICE POINTS

<<A>> DRIVE BELT REMOVAL



1. Loosen the nut for alternator pivot bolt and alternator fixing nut.

⚠ CAUTION

To reuse the drive belt, draw an arrow indicating the rotating direction (clockwise) on the back of the belt using chalk, etc.

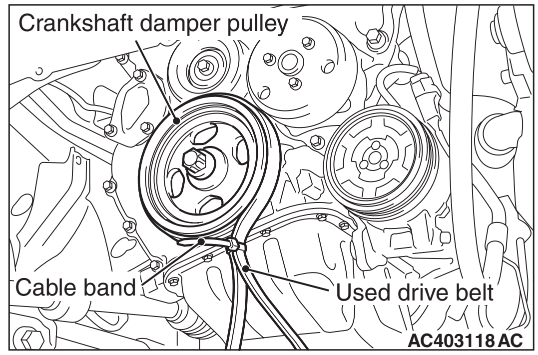
2. Turn the adjusting bolt in the anti-clockwise direction (to the left) to remove the drive belt.

<<B>> CRANKSHAFT PULLEY BOLT REMOVAL

Use the used drive belt to fix the crankshaft damper pulley, and loosen the crankshaft pulley bolt.

⚠ CAUTION

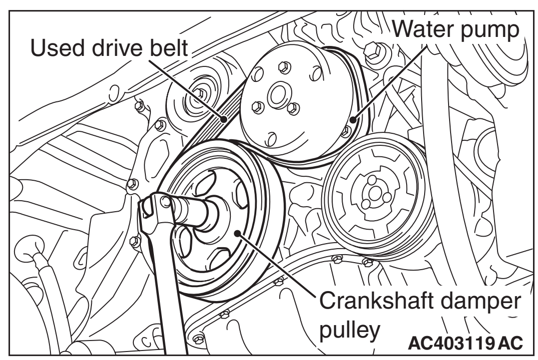
- **Do not use the drive belt set up on the vehicles.**
- **Do not use a cracked or damaged drive belt.**



1. Set the used drive belt as shown and hold it with a cable band.

⚠ CAUTION

Do not hang the used drive belt for the crankshaft rotation stopper on the water pump pulley.

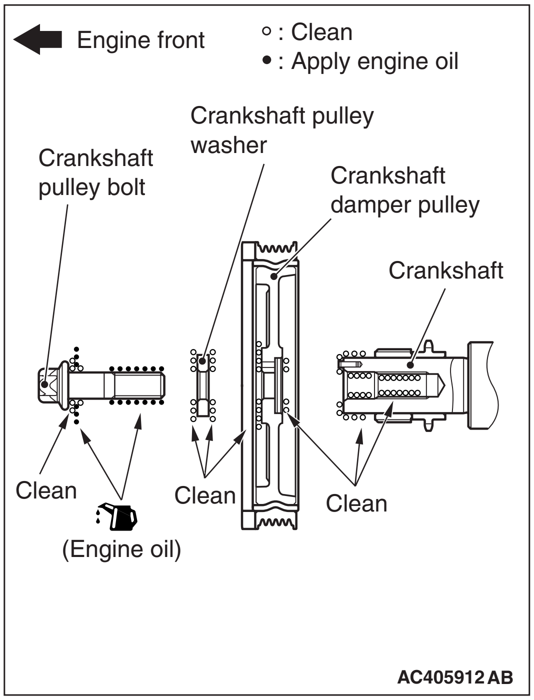


2. Turning the crankshaft damper pulley to the anti-clockwise direction (to the left), loop the used drive belt around the water pump body, hold the crankshaft damper pulley and remove the crankshaft pulley bolt.

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INSTALLATION SERVICE POINT

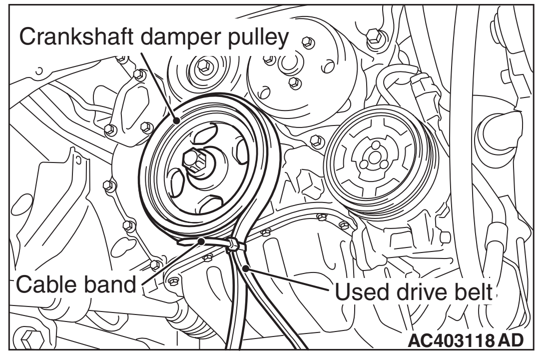
>>A<< CRANKSHAFT DAMPER PULLEY/CRANKSHAFT PULLEY WASHER/CRANKSHAFT PULLEY BOLT INSTALLATION



1. Clean the screw hole of the crankshaft, the crankshaft damper pulley, the crankshaft pulley bolt and the crankshaft pulley washer.
2. Install the crankshaft damper pulley.
3. Apply an appropriate quantity of new engine oil to the thread of crankshaft pulley bolt.

⚠ CAUTION

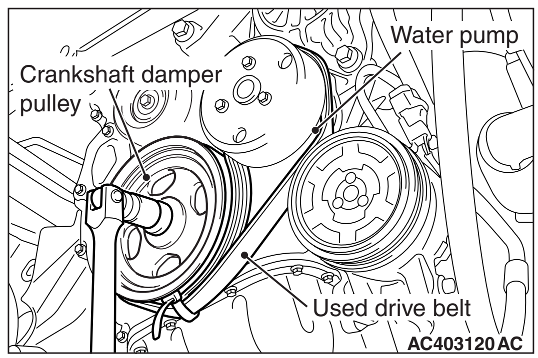
- **Do not use the drive belt set up on the vehicles.**
- **Do not use a cracked or damaged drive belt.**



4. Set the used drive belt and hold it with a cable band as during removal.

⚠ CAUTION

Do not hang the used drive belt for the crankshaft rotation stopper on the water pump pulley.



5. Turning the crankshaft damper pulley to the clockwise direction (to the right), loop the used drive belt around the water pump body, hold the crankshaft damper pulley and tighten the crankshaft pulley bolt to the specified torque.

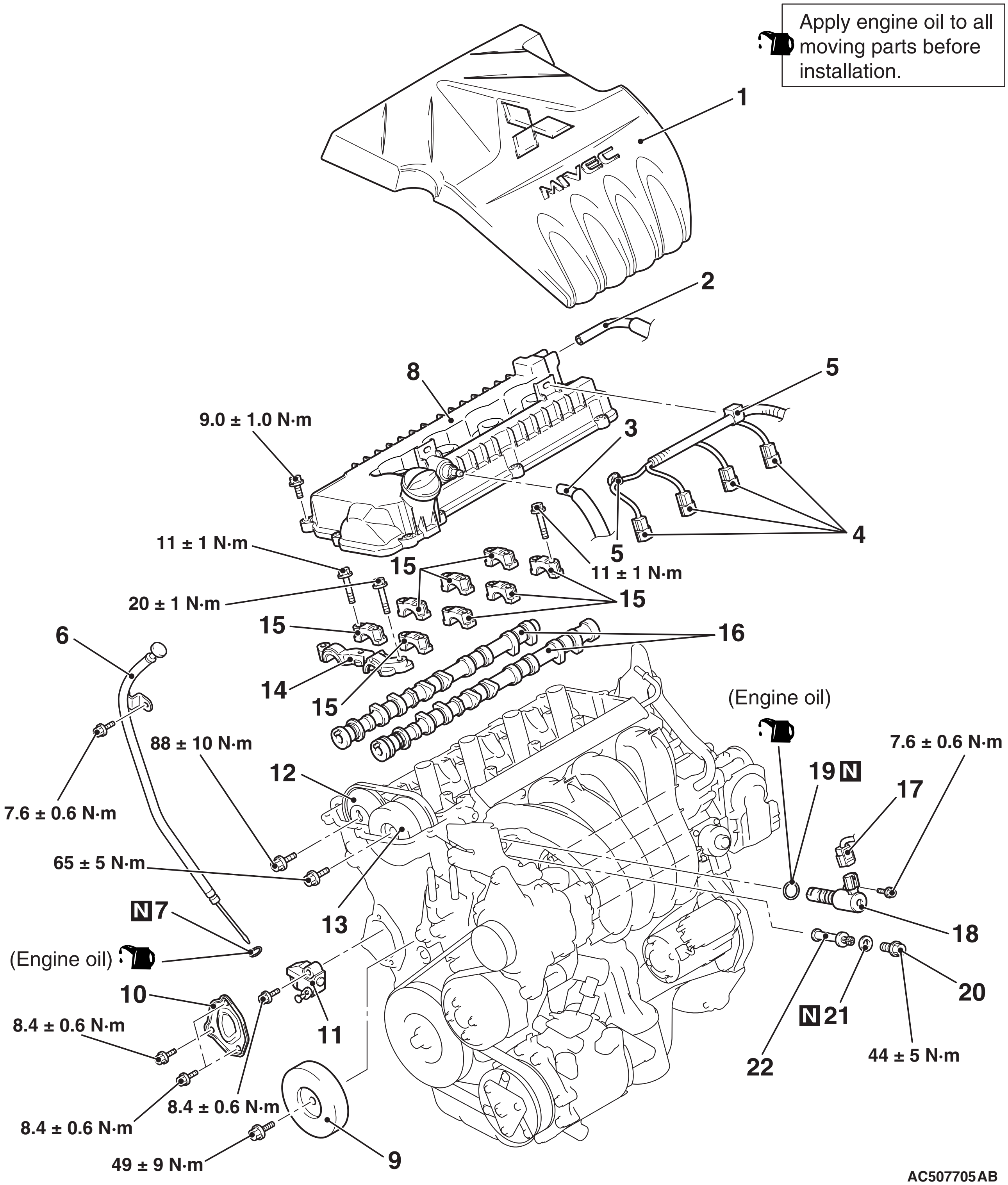
   Tightening torque:190 N·m

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CAMSHAFT

REMOVAL AND INSTALLATION

M1112007800111



Camshaft removal steps

- Air cleaner assembly removal (Refer to GROUP 15, Air Cleaner P.15-5).
- Ignition coil (Refer to GROUP 16, Ignition System – Ignition Coil P.16-36).
- Cowl top panel (Refer to GROUP 42, Loose Panel P.42-81).

1. Engine cover

<<A>>

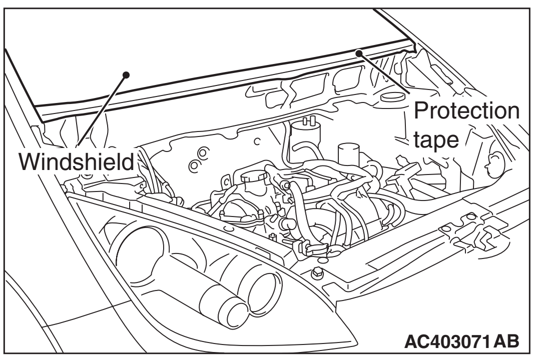
			Camshaft removal steps
		2.	Breather hose connection
		3.	PCV hose connection
		4.	Fuel injector connector
		5.	Control harness clamp connection
		6.	Engine oil level gauge and guide assembly
		7.	O-ring
<<B>>	>>F<<	8.	Cylinder head cover assembly
		9.	Tensioner pulley
		•	Valve clearance adjustment (Refer to P.11A-10).
	>>E<<	10.	Timing chain tensioner cover
<<C>>	>>D<<	11.	Timing chain tensioner
<<D>>	>>C<<	12.	Camshaft sprocket
<<D>>	>>C<<	13.	V.V.T. sprocket assembly
<<D>>	>>C<<	14.	Front camshaft bearing cap
<<D>>	>>C<<	15.	Camshaft bearing cap
<<D>>	>>C<<	16.	Camshaft
			Oil control valve removal steps
		17.	Oil control valve connector
<<E>>	>>B<<	18.	Oil control valve
	>>B<<	19.	O-ring
		20.	Oil control valve filter bolt
		21.	Gasket
<<E>>	>>A<<	22.	Oil control valve filter

REMOVAL SERVICE POINTS

<<A>> COWL TOP PANEL REMOVAL

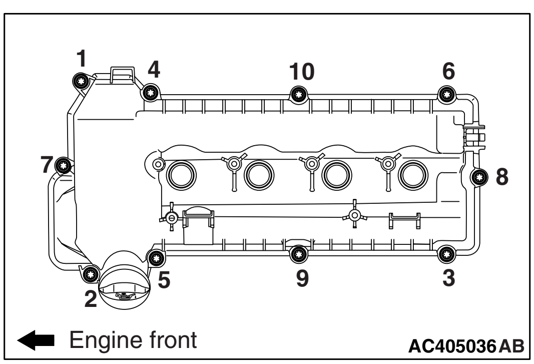
⚠ CAUTION

After removing the cowl top panel, perform operation with care not to damage the windshield.



After removing the cowl top panel, attach a protection tape for the windshield on the lower area of the windshield.

<<B>> CYLINDER HEAD COVER ASSEMBLY REMOVAL

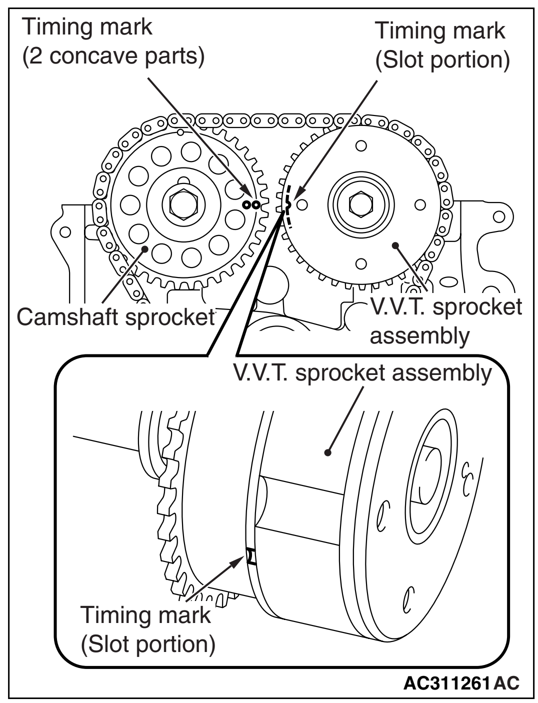


Loosen the cylinder head cover assembly mounting bolts in the order of the numbers shown in the illustration.

<<C>> TIMING CHAIN TENSIONER REMOVAL

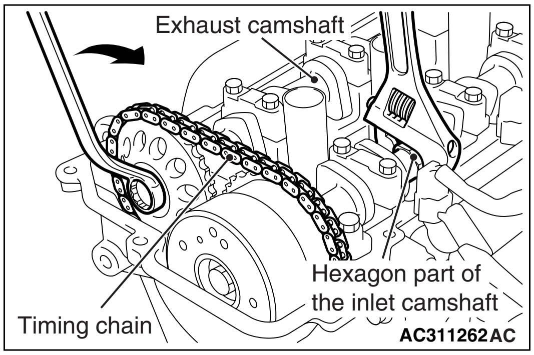
⚠ CAUTION

Never turn the crankshaft anti-clockwise.

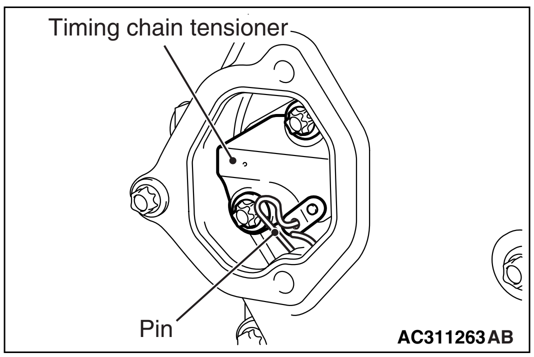


1. Turn the crankshaft clockwise, and align the timing mark of the camshaft sprocket (2 conceive areas in front of the camshaft sprocket) and that of the V.V.T. sprocket assembly (the groove of V.V.T. sprocket assembly side face). Then set No.1 cylinder to the TDC.

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2. While holding the inlet camshaft hexagonal area with a wrench or a similar tool, slightly turn the exhaust camshaft clockwise to tighten the timing chain at the timing chain tensioner side and shorten the plunger of the timing chain tensioner.



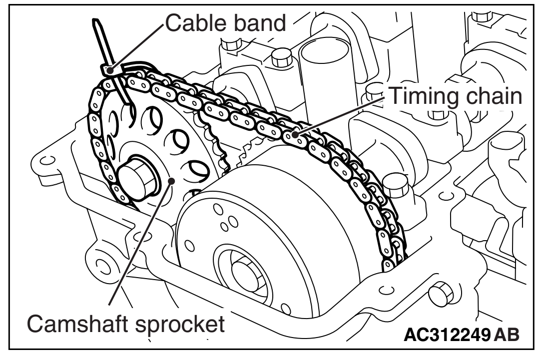
3. With the plunger of the tensioner shortened, insert a pin or a similar tool (3 mm or less in diameter) to the hole shown in the illustration of the timing chain tensioner.

⚠ CAUTION

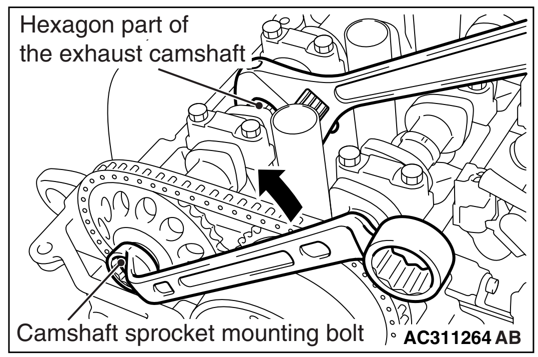
Do not turn the crankshaft after removing the timing chain tensioner.

4. Loosen the timing chain tensioner mounting bolts, and remove the timing chain tensioner from the timing chain case hole.

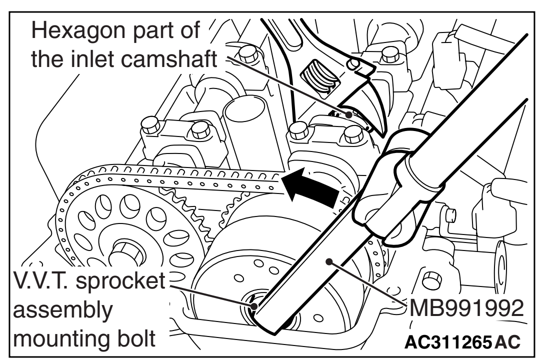
<<D>> CAMSHAFT SPROCKET/ V.V.T. SPROCKET ASSEMBLY/FRONT CAMSHAFT BEARING CAP/CAMSHAFT BEARING CAP/CAMSHAFT REMOVAL



1. Fix the camshaft sprocket and the timing chain using a cable band or a similar tool.

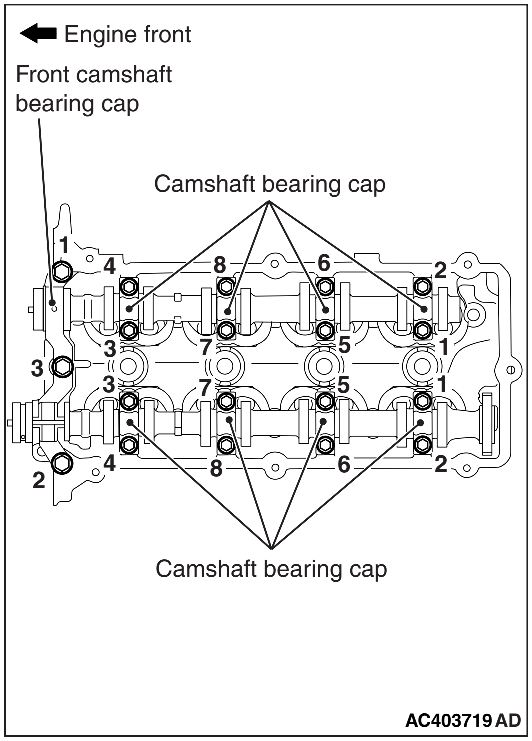


2. While holding the exhaust camshaft hexagonal area with a wrench or a similar tool, loosen the camshaft sprocket mounting bolt.



3. While holding the inlet camshaft hexagonal area using a wrench or a similar tool, use special tool torque wrench adapter (MB991992) to loosen the V.V.T. sprocket assembly mounting bolt.

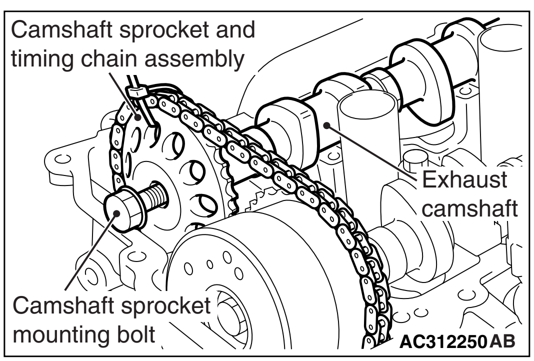
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4. Loosen the front camshaft bearing cap mounting bolts, and then loosen each camshaft bearing cap mounting bolts in the order shown. Remove the front camshaft bearing cap and each camshaft bearing cap.

⚠ CAUTION

Do not turn the crankshaft after removing the camshaft sprocket assembly with the timing chain.



5. Slightly raise the exhaust camshaft with the camshaft sprocket and timing chain assembly from the cylinder head, remove the camshaft sprocket mounting bolt, and disconnect the camshaft sprocket and timing chain assembly from the exhaust camshaft.
6. In the same way as Step 5, disconnect the V.V.T. sprocket assembly and timing chain assembly from the inlet camshaft.

⚠ CAUTION

After disconnecting the camshaft sprocket and the V.V.T. sprocket assembly (with the timing chain for each) from the camshaft, do not dislocate the camshaft sprocket, the V.V.T. sprocket assembly, and the timing chain.

7. After removal, place the camshaft sprocket and timing chain assembly, and the V.V.T. sprocket assembly and timing chain assembly on the timing chain case assembly

<<E>> OIL CONTROL VALVE/OIL CONTROL VALVE FILTER REMOVAL

⚠ CAUTION

After removing the oil control valve and the oil control valve filter, be careful that no dust or other objects enter the oil passage in the cylinder head.

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INSTALLATION SERVICE POINTS

>>A<< OIL CONTROL VALVE FILTER INSTALLATION

⚠ CAUTION

When installing the oil control valve filter, exercise special care to avoid adhesion of foreign objects and damage/deformation of the filter.

>>B<< O-RING/OIL CONTROL VALVE INSTALLATION

1. Cover the oil groove of the oil control valve with a cardboard.

⚠ CAUTION

When installing the O-ring to the oil control valve, take care not to damage the O-ring.

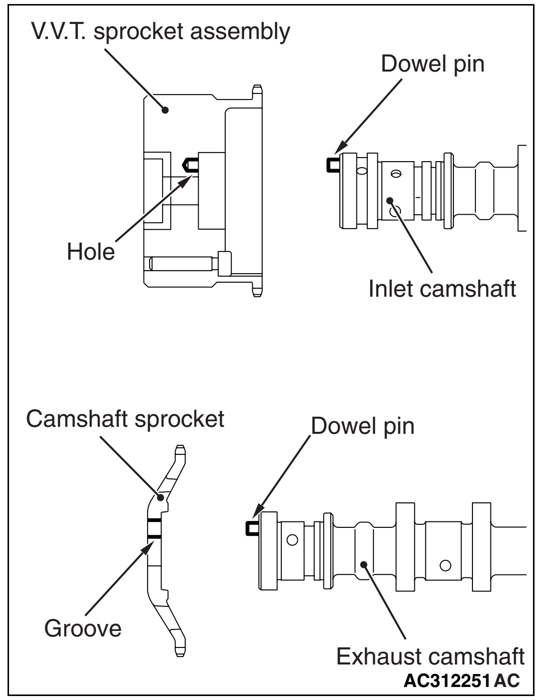
2. Apply the engine oil to the O-ring and install it to the oil control valve.

⚠ CAUTION

When installing the oil control valve to the cylinder head, take care not to damage the O-ring.

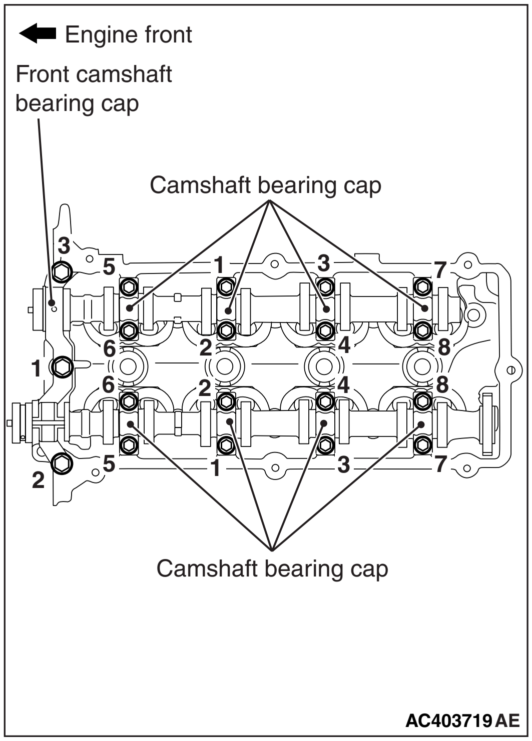
3. Apply the engine oil to the O-ring and install the oil control valve to the cylinder head.

>>C<< CAMSHAFT/CAMSHAFT BEARING CAP/FRONT CAMSHAFT BEARING CAP/ V.V.T. SPROCKT ASSEMBLY/CAMSHAFT SPROCKET INSTALLATION



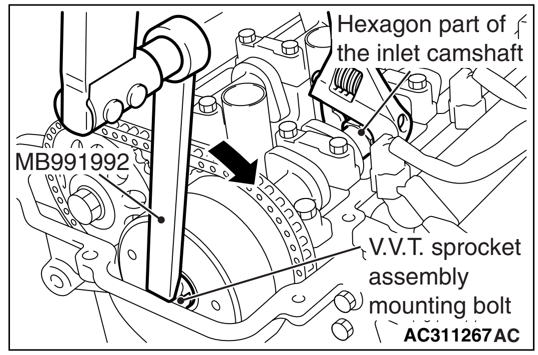
1. First, lift the V.V.T. sprocket assembly side of the camshaft sprocket, V.V.T. sprocket assembly and the timing chain assembly. Then align the dowel pin of the inlet camshaft with the V.V.T. sprocket assembly hole, and assemble the inlet camshaft and the V.V.T. sprocket assembly. Temporarily tighten the mounting bolt.
2. Next, lift the camshaft sprocket side of the camshaft sprocket, V.V.T. sprocket assembly and the timing chain assembly. Then align the dowel pin of the exhaust camshaft with the camshaft sprocket groove, and assemble the exhaust camshaft and the camshaft sprocket. Temporarily tighten the mounting bolt.
3. Place the inlet camshaft and exhaust camshaft on the installing location of the cylinder head.

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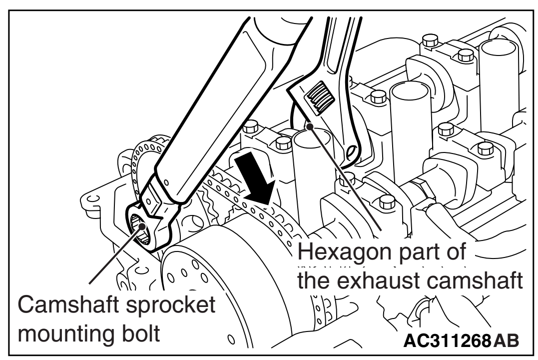
4. Tighten each camshaft bearing cap mounting bolts to the specified torque in the order shown, and then tighten the front camshaft bearing cap mounting bolts as well.

Tightening torque:
11 ± 1 N·m (Camshaft bearing cap mounting bolts)
20 ± 1 N·m (Front camshaft bearing cap mounting bolts)



5. While holding the inlet camshaft hexagonal area using a wrench or a similar tool, use special tool torque wrench adapter (MB991992) to tighten the V.V.T. sprocket assembly mounting bolt to the specified torque. Since the V.V.T. sprocket assembly mounting bolt is tightened by special tool (MB991992), calculate the tightening torque by the following formula.

Tightening torque: (65 ± 5) × {L ÷ (L + 150)} N·m
65 ± 5: Tightening torque of the V.V.T. sprocket assembly mounting bolt (unit: N·m)
L: Distance between the centre of a torque wrench drive and of its handle (unit: mm)
150: Length of special tool (unit: mm)

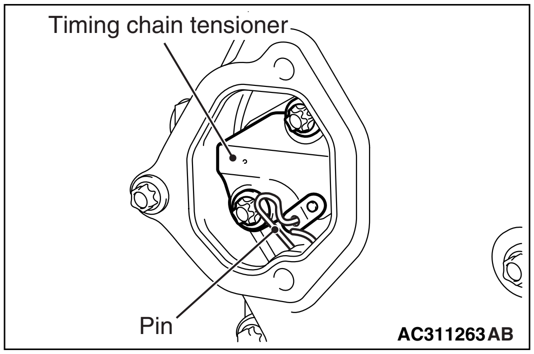


6. While holding the exhaust camshaft hexagonal area using a wrench or similar tool, tighten the camshaft sprocket mounting bolt to the specified torque.

Tightening torque: 88 ± 10 N·m

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>>D<< TIMING CHAIN TENSIONER INSTALLATION



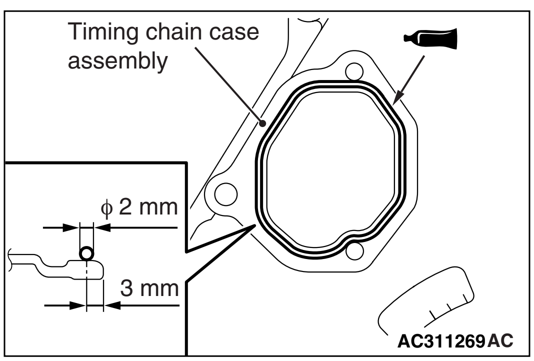
1. Install the timing chain tensioner with the pin or the similar tool to the cylinder block through the timing chain case hole, and tighten the timing chain tensioner mounting bolts to the specified torque.

   Tightening torque: 8.4 ± 0.6 N·m

2. Pull out the pin or the similar tool of the timing chain tensioner.

>>E<< TIMING CHAIN TENSIONER COVER INSTALLATION

1. Remove the sealant from the installation face of the timing chain tensioner cover and the timing chain case assembly.

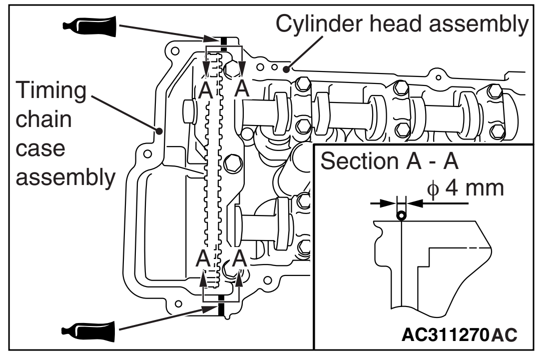


2. Apply a bead of the specified sealant to the mating surface of the timing chain case assembly. Then, install the timing chain tensioner cover to the timing chain case assembly within 3 minutes.

   Specified sealant: LOCTITE 5971 or exact equivalent

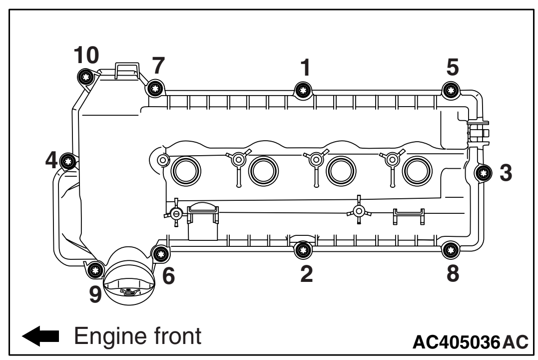
>>F<< CYLINDER HEAD COVER ASSEMBLY INSTALLATION

1. Remove the sealant from the cylinder head cover assembly and the matching area of the cylinder head assembly and the timing chain case assembly.



2. Apply specified sealant to the matching area of the cylinder head assembly and the timing chain case assembly as shown, and install the cylinder head cover assembly to the cylinder head assembly within 3 minutes.

   Specified sealant: LOCTITE 5971 or exact equivalent



3. Tighten the cylinder head cover assembly mounting bolts to the specified torque in the order of the numbers shown in the illustration.

   Tightening torque: 9.0 ± 1.0 N·m

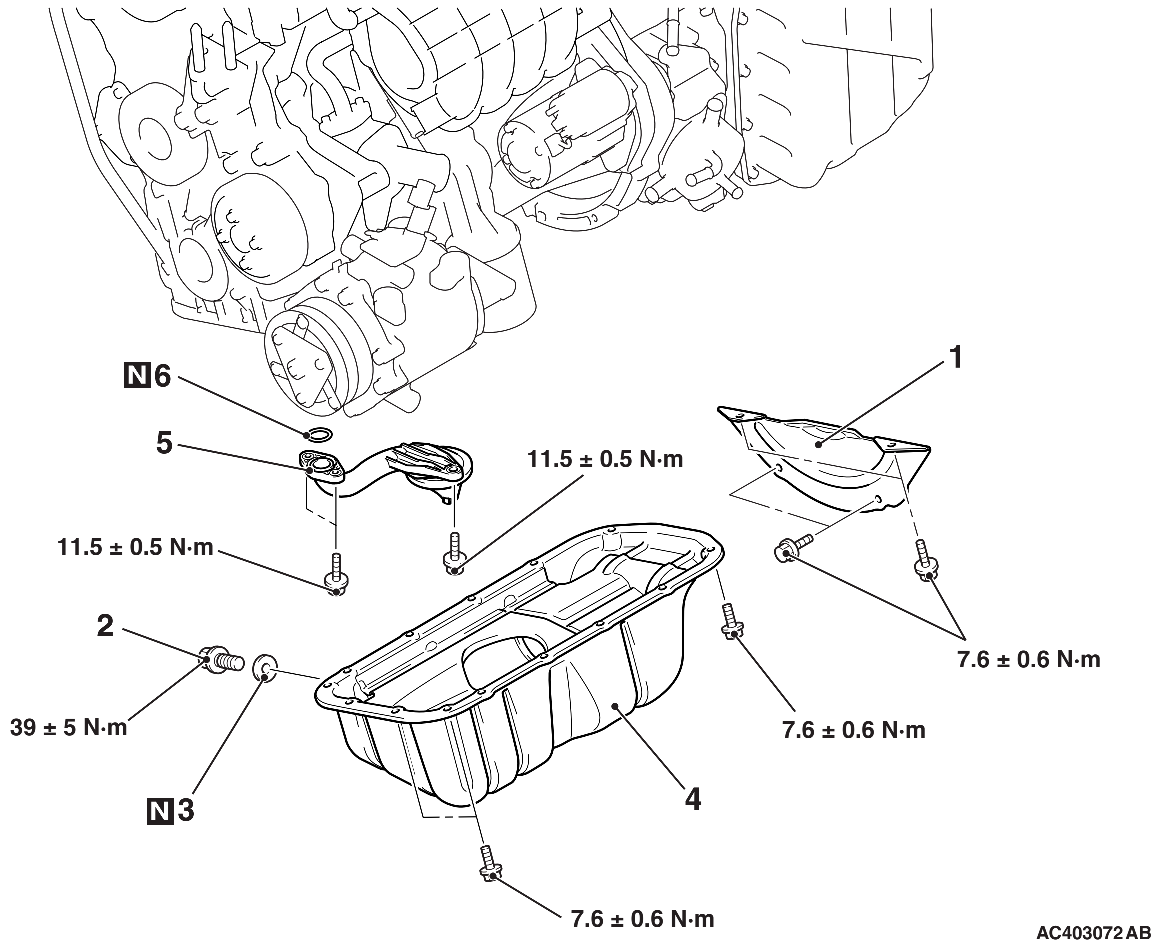
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OIL PAN

REMOVAL AND INSTALLATION

M1112002801443

Pre-removal Operation	Post-installation Operation
• Front Under Cover Panel Assembly Removal (Refer to GROUP 51, Front Bumper Assembly and Radiator Grille P.51-2). • Engine Room Side Under Cover (RH) Removal • Engine Oil Draining (Refer to GROUP 12, On-vehicle Service – Engine Oil Replacement P.12-3). • Crankshaft Damper Pulley Removal (Refer to P.11A-14).	• Crankshaft Damper Pulley Installation (Refer to P.11A-14). • Engine Oil Refilling (Refer to GROUP 12, On-vehicle Service – Engine Oil Replacement P.12-3). • Engine Room Side Under Cover (RH) Installation • Front Under Cover Panel Assembly Installation (Refer to GROUP 51, Front Bumper Assembly and Radiator Grille P.51-2).



Removal steps

- • Engine oil level gauge
- 1. Bell housing cover
- 2. Engine oil pan drain plug

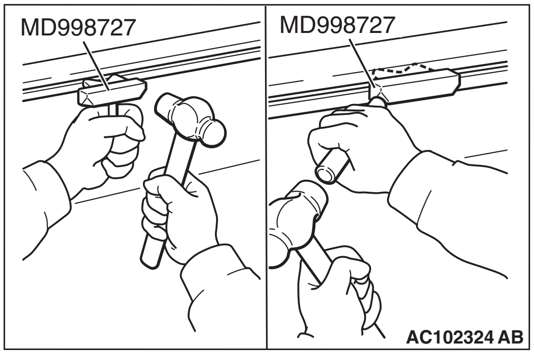
Removal steps (Continued)

- 3. Engine oil pan drain plug gasket
- <<**A**>> >>**B**<< 4. Engine oil pan
- >>**A**<< 5. Engine oil screen assembly
- >>**A**<< 6. O-ring

REMOVAL SERVICE POINT

<<A>> ENGINE OIL PAN REMOVAL

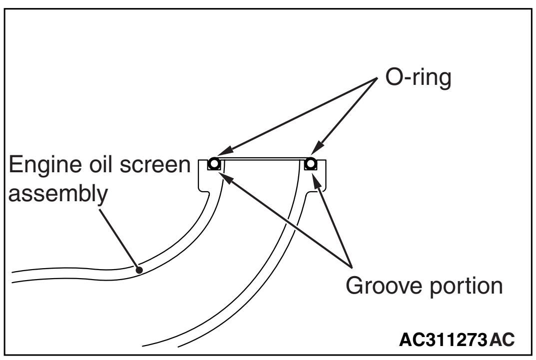
1. Remove the engine oil pan mounting bolts.



2. Use special tool oil pan FIPG cutter (MD998727) to remove the engine oil pan.

INSTALLATION SERVICE POINTS

>>A<< O-RING/ENGINE OIL SCREEN ASSEMBLY INSTALLATION



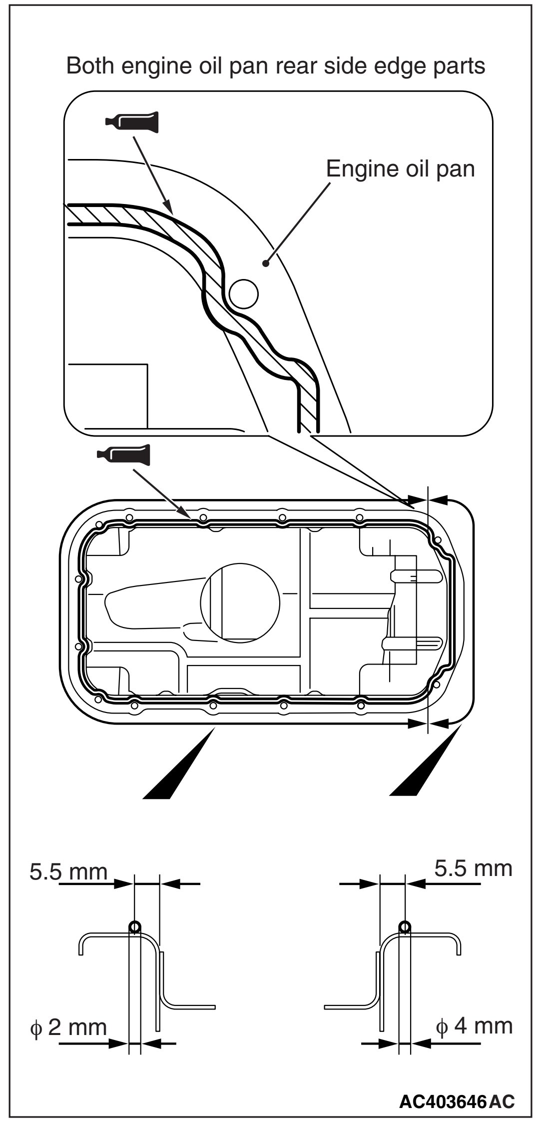
Confirm that the O-ring is securely fitted in the engine oil screen assembly groove without causing any torsion or damage. Then install the engine oil screen assembly.

>>B<< ENGINE OIL PAN INSTALLATION

1. Remove sealant from the engine oil pan and cylinder block surfaces.

⚠ CAUTION

As oil leak is likely to occur at both ends of the rear side of the engine oil pan, be sure to apply the specified sealant as shown.



2. Apply a bead of the specified sealant to the cylinder block mating surface of the engine oil pan, and install the engine oil pan to the cylinder block within 3 minutes.

    Specified sealant: LOCTITE 5971 or exact equivalent

⚠ CAUTION

Then wait at least one hour. Never start the engine or let engine oil or coolant touch the sealant surface during that time.

3. Tighten the engine oil pan mounting bolts to the specified torque.

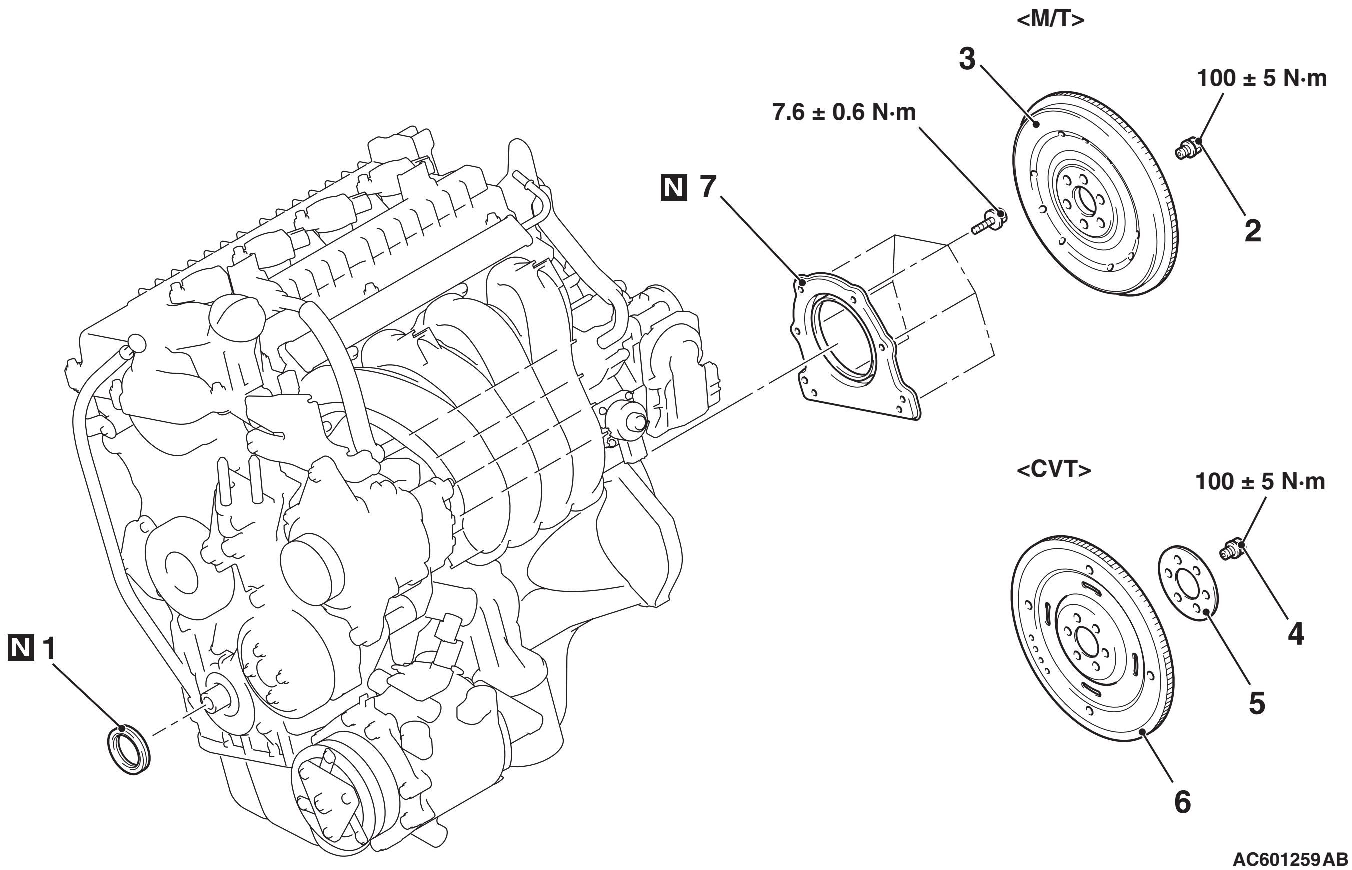
    Tightening torque: 7.6 ± 0.6 N·m

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CRANKSHAFT OIL SEAL

REMOVAL AND INSTALLATION

M1112003101384



Crankshaft front oil seal removal steps

- Crankshaft damper pulley (Refer to P.11A-14).

>>**C**<< 1. Crankshaft front oil seal

Crankshaft rear oil seal removal steps <M/T>

- Transmission assembly (Refer to GROUP 22A, Transmission Assembly P.22A-7).
- Clutch cover and clutch disc (Refer to GROUP 21B, Clutch P.21B-3).
- Engine oil pan (Refer to P.11A-24).

<<**A**>> >>**B**<< 2. Flywheel bolt
>>**B**<< 3. Flywheel assembly
>>**A**<< 7. Crankshaft rear oil seal case assembly

Crankshaft rear oil seal removal steps <CVT>

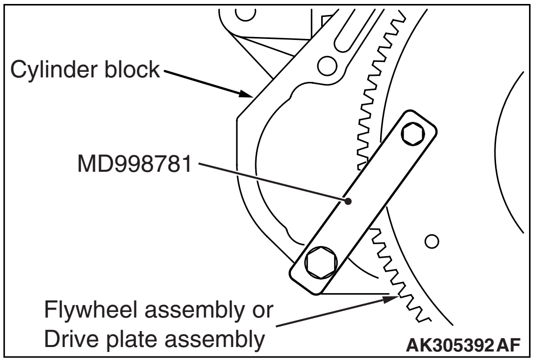
- Transmission assembly (Refer to GROUP 23A, Transmission Assembly P.23A-150).
- Engine oil pan (Refer to P.11A-24).

<<**A**>> >>**B**<< 4. Drive plate bolt
>>**B**<< 5. Adapter plate
>>**B**<< 6. Drive plate assembly
>>**A**<< 7. Crankshaft rear oil seal case assembly

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Group TOC

REMOVAL SERVICE POINT

<<A>> FLYWHEEL BOLT/DRIVE PLATE BOLT REMOVAL

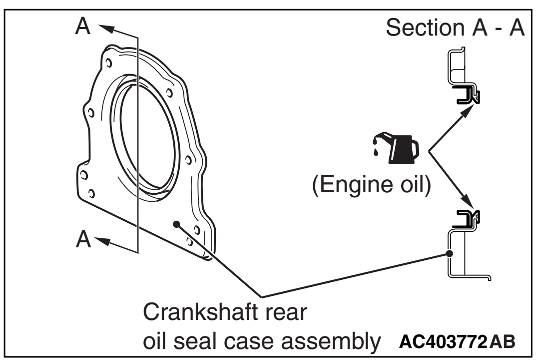


1. Use special tool flywheel stopper (MD998781) to secure the flywheel assembly or drive plate assembly.
2. Remove the flywheel bolts or drive plate bolts.

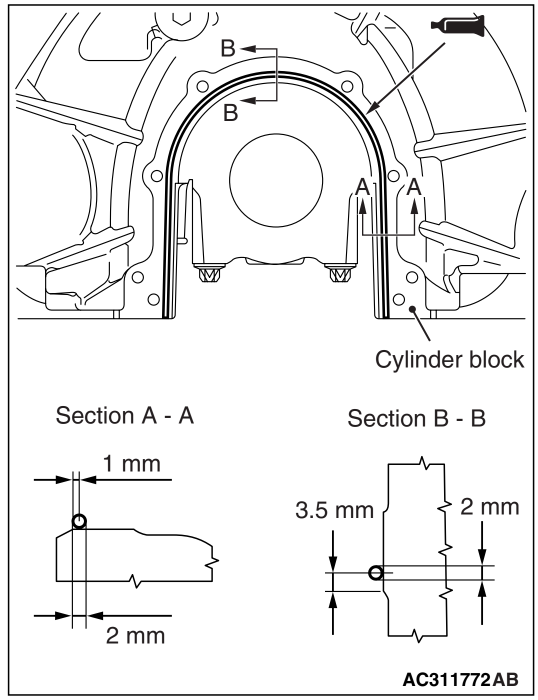
INSTALLATION SERVICE POINTS

>>A<< CRANKSHAFT REAR OIL SEAL CASE ASSEMBLY INSTALLATION

1. Remove sealant from the cylinder block surfaces.



2. Apply a small amount of engine oil to all areas around the oil seal lip.



3. Apply a bead of specified sealant to the crankshaft rear oil seal case assembly mating surface of the cylinder block as shown.

   Specified sealant: LOCTITE 5971 or exact equivalent

⚠ CAUTION

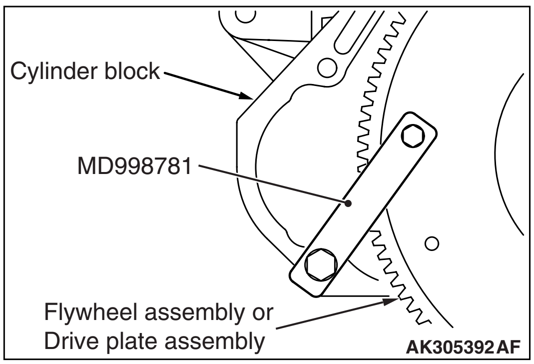
Install the crankshaft rear oil seal case assembly not to damage the crankshaft rear oil seal.

4. Within 3 minutes after applying the specified sealant, install the crankshaft rear oil seal case assembly to the cylinder block, and tighten the mounting bolts to the specified torque.

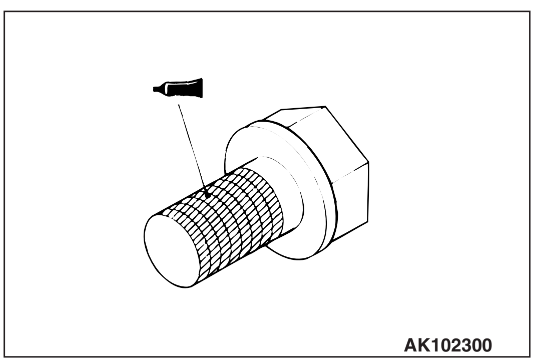
   Tightening torque: 7.6 ± 0.6 N·m

>>B<< DRIVE PLATE ASSEMBLY/ADAPTER PLATE/DRIVE PLATE BOLT/FLYWHEEL ASSEMBLY/FLYWHEEL BOLT INSTALLATION

1. Remove the sealant, the engine oil, and other adhering materials from the flywheel assembly or drive plate assembly installation face, adapter plate, crankshaft screw hole, and flywheel bolts or drive plate bolts.
2. Install the flywheel assembly or drive plate assembly to the crankshaft.



3. Use special tool flywheel stopper (MD998781) to secure the flywheel assembly or drive plate assembly in the same manner as removal.
4. Apply a small amount of engine oil to the face of the flywheel bolts or drive plate bolts and the crankshaft screw holes.



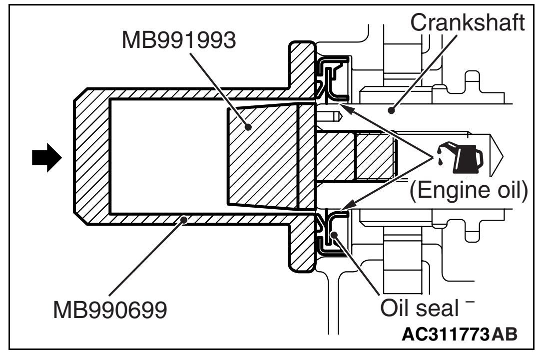
5. Apply specified sealant to the flywheel bolt or drive plate bolt threads.

   Specified sealant: LOCTITE 2701 or equivalent

6. Tighten the flywheel bolts or drive plate bolts to the specified torque in a crisscross pattern.

   Tightening torque: 100 ± 5 N·m

>>C<< CRANKSHAFT FRONT OIL SEAL INSTALLATION



1. Apply a small amount of engine oil to the outer circumference of special tool crankshaft front oil seal guide (MB991993) and install it to the crankshaft.
2. Apply a small amount of engine oil to the entire inner circumference of the oil seal lip.

⚠ CAUTION

Install the crankshaft front oil seal not to damage the crankshaft front oil seal.

3. Using special tool differential oil seal installer (MB990699), drive the oil seal so that it is flush with the timing chain case assembly.

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ENGINE ASSEMBLY

REMOVAL AND INSTALLATION <M/T>

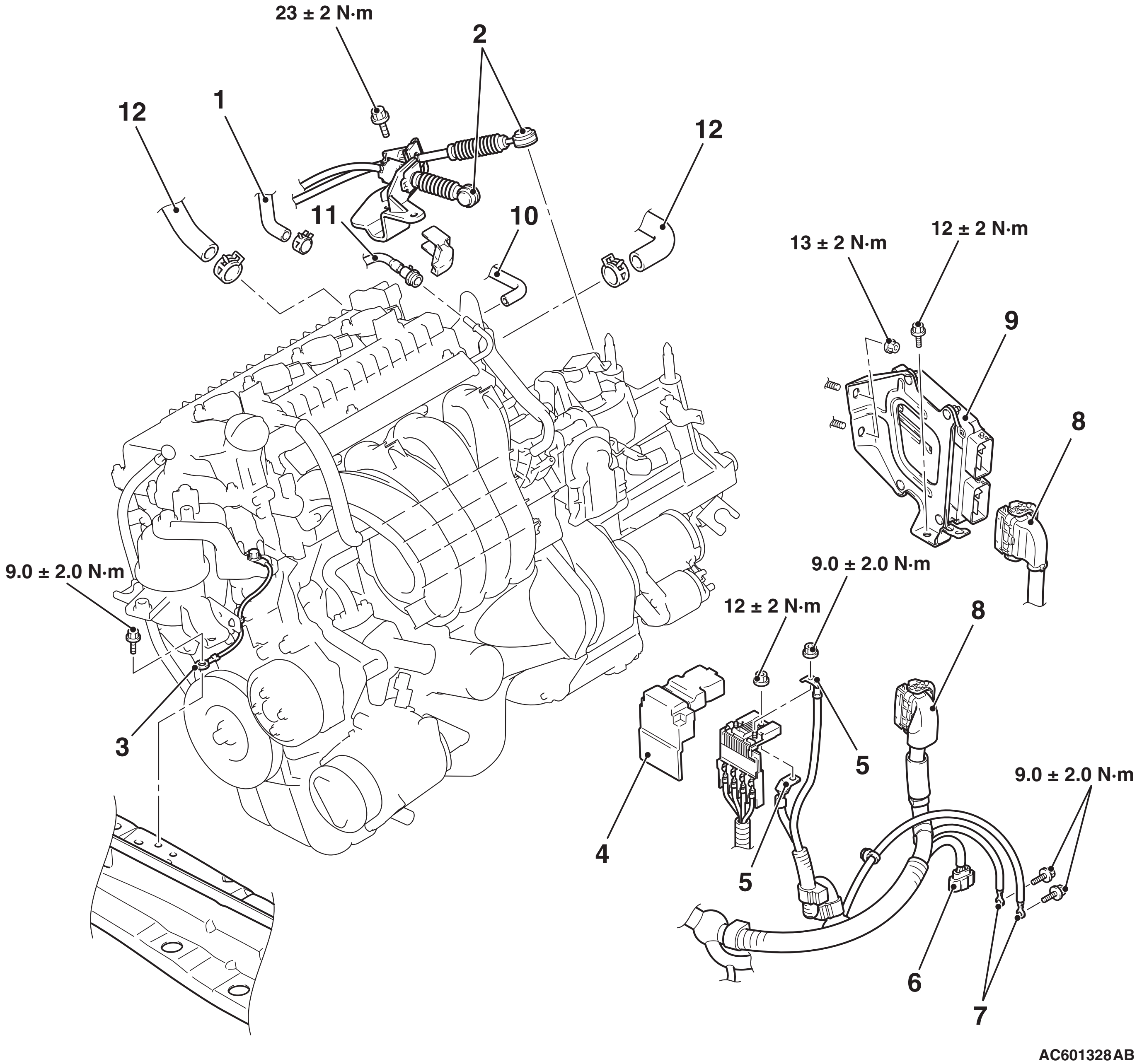
M1112001002942

⚠ CAUTION

When the engine assembly replacement is performed, use the M.U.T.-III to initialise the learning value (Refer to GROUP 00, Precautions Before Service – Initialisation Procedure for Learning Value in MPI Engine P.00-20).

Pre-removal Operation	Post-installation Operation
• Fuel Line Pressure Reduction [Refer to GROUP 13A, On-vehicle Service – Fuel Pump Connector Disconnection (How to Reduce Pressurized Fuel Lines) P.13A-357]. • Front Under Cover Panel Assembly Removal (Refer to GROUP 51, Front Bumper Assembly and Radiator Grille P.51-2). • Engine Room Side Under Cover Removal • Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-4). • Engine Oil Draining (Refer to GROUP 12, On-vehicle Service – Engine Oil Replacement P.12-3). • Transmission Oil Draining (Refer to GROUP 22A, On-vehicle Service – Transmission Oil Replacement P.22A-4). • Air Cleaner Assembly Removal (Refer to GROUP15, Air Cleaner P.15-5). • Battery and Battery Tray Removal • Alternator and Alternator Brace Removal (Refer to GROUP 16, Charging System – Alternator Assembly P.16-13). • Drive Shaft Removal (Refer to GROUP 26, Drive Shaft Assembly P.26-16). • Front Bumper Face Assembly Removal (Refer to GROUP 51, Front Bumper Assembly and Radiator Grille P.51-2). • Radiator Assembly Removal (Refer to GROUP 14, Radiator P.14-22). • Exhaust Manifold Removal (Refer to GROUP15, Exhaust Manifold P.15-14).	• Exhaust Manifold Installation (Refer to GROUP 15, Exhaust Manifold P.15-14). • Radiator Assembly Installation (Refer to GROUP 14, Radiator P.14-22). • Front Bumper Face Assembly Installation (Refer to GROUP 51, Front Bumper Assembly and Radiator Grille P.51-2). • Drive Shaft Installation (Refer to GROUP 26, Drive Shaft Assembly P.26-16). • Alternator and Alternator Brace Installation (Refer to GROUP 16, Charging System – Alternator Assembly P.16-13). • Battery and Battery Tray Installation • Air Cleaner Assembly Installation (Refer to GROUP 15, Air Cleaner P.15-5). • Transmission Oil Refilling (Refer to GROUP 22A, On-vehicle Service – Transmission Oil Replacement P.22A-4). • Engine Oil Refilling (Refer to GROUP12, On-vehicle Service – Engine Oil Replacement P.12-3). • Engine Coolant Refilling (Refer to GROUP 14 - On-vehicle Service – Engine Coolant Replacement P.14-4). • Drive Belt Tension Check and Adjustment (Refer to P.11A-6). • Engine Room Side Under Cover Installation • Front Under Cover Panel Assembly Installation (Refer to GROUP 51, Front Bumper Assembly and Radiator Grille P.51-2). • Fuel Leak Check

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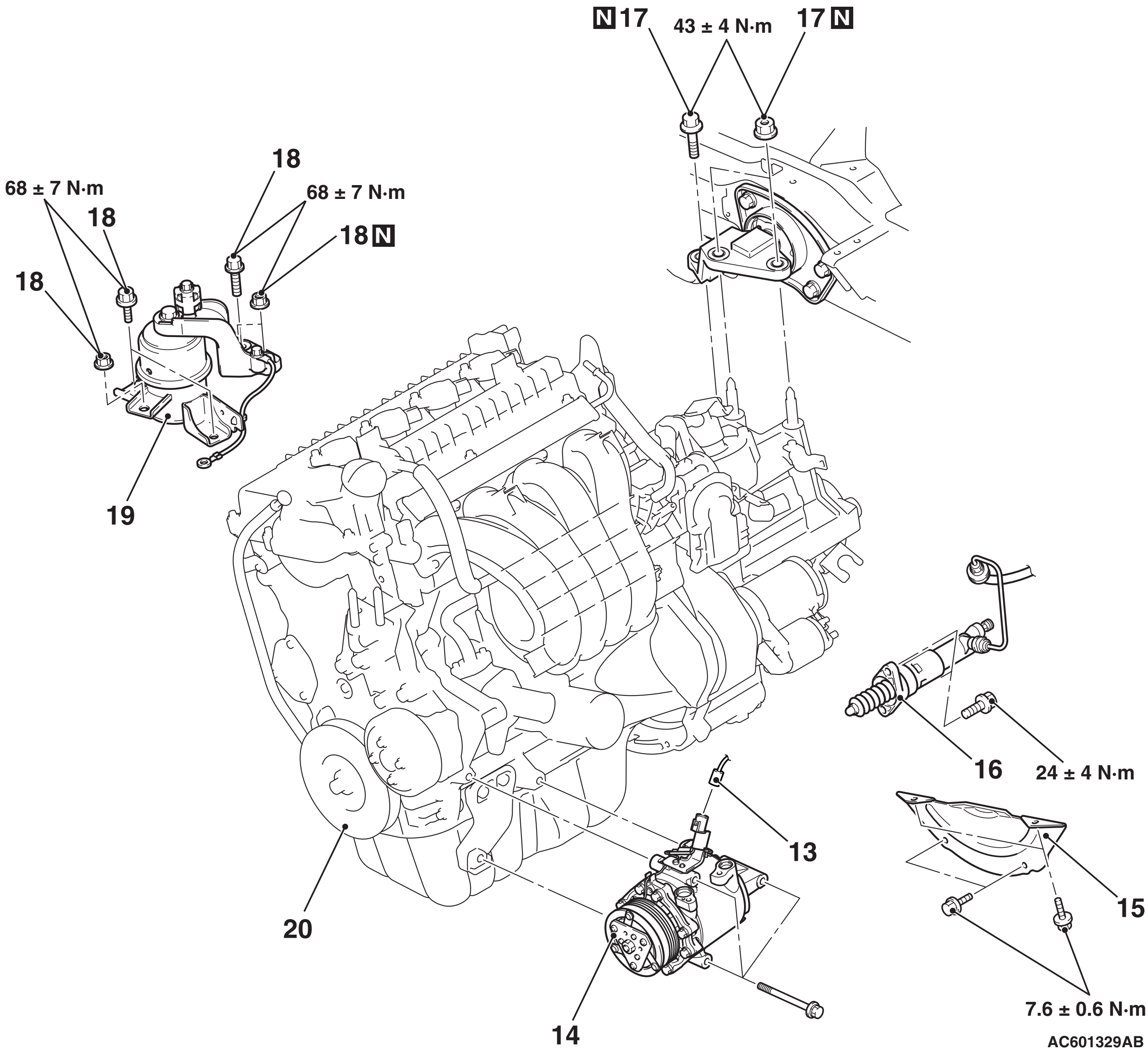
Removal steps

- >>**C**<< • Initialisation <Installation only>
- 1. Brake booster vacuum hose connection
- <<**A**>> 2. Gearshift cable and select cable connection
- 3. Earth cable connection
- 4. Fusible link box cover
- 5. Battery cable connection

Removal steps (Continued)

- 6. Control wiring harness connection
- 7. Earth cable connection
- 8. Engine-ECU connector
- 9. Engine-ECU
- 10. Purge solenoid hose connection
- <<**B**>> >>**B**<< 11. Fuel high-pressure hose connection
- 12. Heater hose connection

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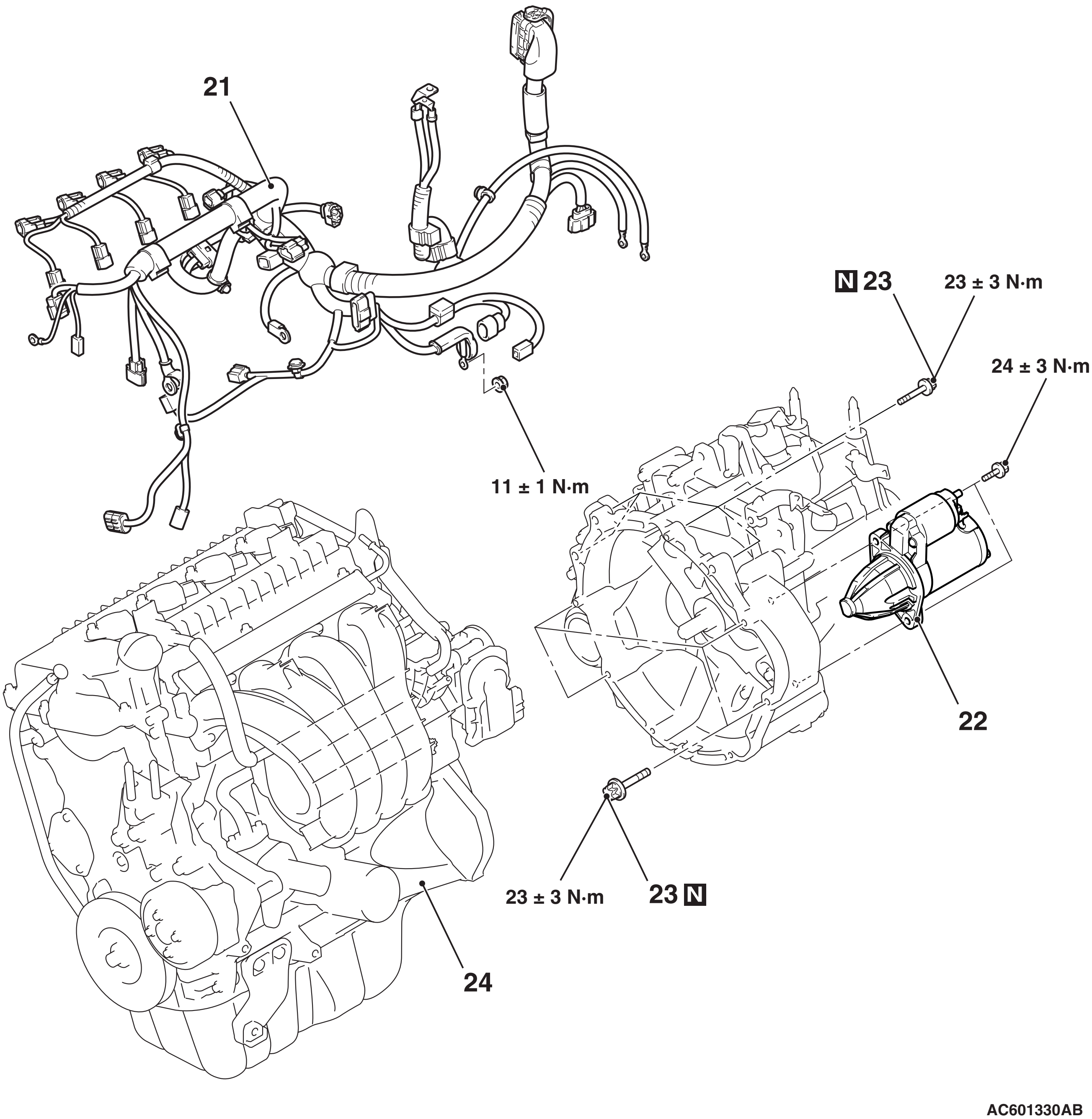
Removal steps

13. A/C compressor connector
14. <<C>> A/C compressor and magnet clutch assembly
15. Bell housing cover
16. <<D>> Clutch release cylinder assembly
- Engine roll stopper rod assembly (Refer to GROUP 32, Engine Roll Stopper Rod P.32-11).

Removal steps (Continued)

17. <<E>> >>A<< Transmission mounting insulator connecting bolt and nut
18. <<E>> >>A<< Engine mounting insulator connecting bolt and nut
19. <<E>> >>A<< Engine mounting insulator
20. <<F>> >>A<< Engine and transmission assembly

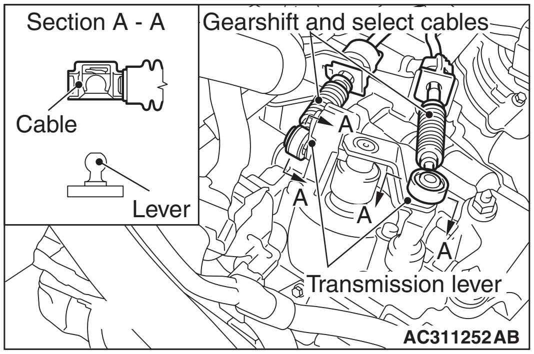
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	Removal steps		Removal steps (Continued)
	21. Control wiring harness	<<**G**>>	23. Transmission connecting bolt
	22. Starter assembly	<<**G**>>	24. Engine assembly

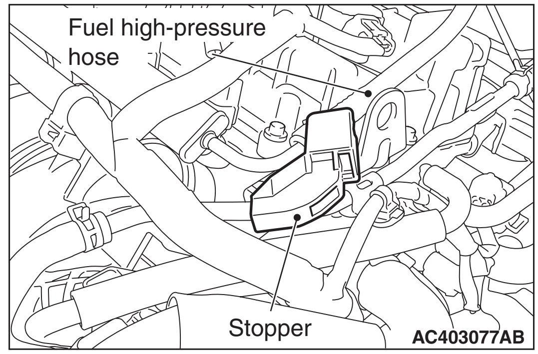
REMOVAL SERVICE POINTS

<<A>> GEARSHIFT AND SELECT CABLE DISCONNECTION

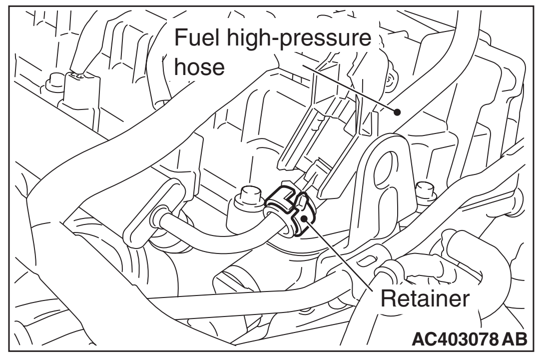


1. Disconnect the transmission assembly-transmission lever from the ends of the gearshift and select cables.
2. With the bracket installed, remove the gearshift and select cables from the transmission assembly.
3. After removing the gearshift and the select cables, tie them in a place where it will not be a hindrance when removing and installing the engine and transmission assembly.

<<B>> FUEL HIGH-PRESSURE HOSE REMOVAL



1. Remove the stopper.



2. Raise the retainer, and pull out the fuel high-pressure hose.

   NOTE: If the retainer comes off, install it securely after pulling out the fuel high-pressure hose.

<<C>> A/C COMPRESSOR AND MAGNET CLUTCH ASSEMBLY REMOVAL

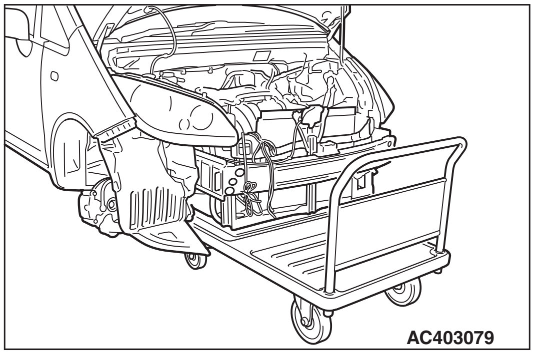
1. With the hose installed, remove the A/C compressor and magnet clutch assembly from the cylinder block.
2. Secure the removed A/C compressor and magnet clutch assembly with cord or rope at a position where they will not interfere with the removal of the engine and transmission assembly.

<<D>> CLUTCH RELEASE CYLINDER ASSEMBLY REMOVAL

1. With the hose installed, remove the clutch release cylinder assembly from the transmission assembly.
2. Secure the removed clutch release cylinder assembly with cord or rope at a position where they will not interfere with the removal of the engine and transmission assembly.

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Group TOC

<<E>> TRANSMISSION MOUNTING INSULATOR CONNECTING BOLT AND NUT/ENGINE MOUNTING INSULATOR CONNECTING BOLT AND NUT/ENGINE MOUNTING INSULATOR REMOVAL



1. Place a cart below the engine and transmission assembly.
2. Lower the lift to the position where the weight of the engine and transmission assembly is not applied to the transmission mounting insulator and the engine mounting insulator.
3. Remove the self-locking nuts, transmission mounting insulator mounting bolt and engine mounting insulator mounting bolts.

⚠ CAUTION

Because the engine assembly is installed with tilted toward the rear side, support the engine and transmission assembly after removing the engine mounting insulator.

4. Remove the engine mounting insulator.

<<F>> ENGINE AND TRANSMISSION ASSEMBLY REMOVAL

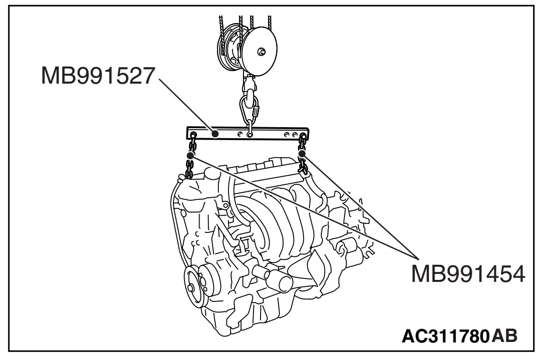
1. Confirm that the cable, the hose, and the harness connector are all disconnected.

⚠ CAUTION

Do not bend the fuel high-pressure hose.

2. Raise the body slowly with a lift, and remove the engine and transmission assembly.

<<G>> TRANSMISSION CONNECTING BOLT/ENGINE ASSEMBLY REMOVAL



1. Install the chain of special tool engine hanger balancer (MB991454) and special tool engine hanger (MB991527), and set the chain block.
2. Remove the transmission assembly connecting bolts.

⚠ CAUTION

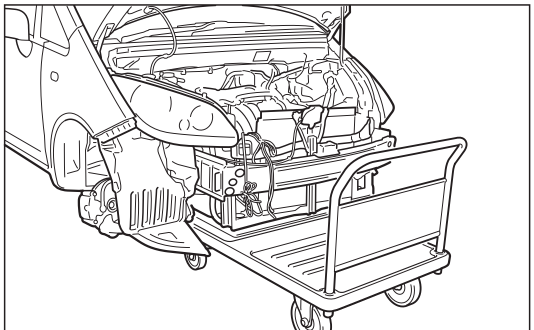
When lifting the engine assembly, operate with care not to lift the transmission assembly.

3. Lift the engine assembly slowly using the chain block, and remove the transmission assembly when the engine assembly is lifted a little.

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INSTALLATION SERVICE POINTS

>>A<< ENGINE AND TRANSMISSION ASSEMBLY/ENGINE MOUNTING INSULATOR/ENGINE MOUNTING INSULATOR CONNECTING BOLT AND NUT/TRANSMISSION MOUNTING INSULATOR CONNECTING BOLT AND NUT INSTALLATION

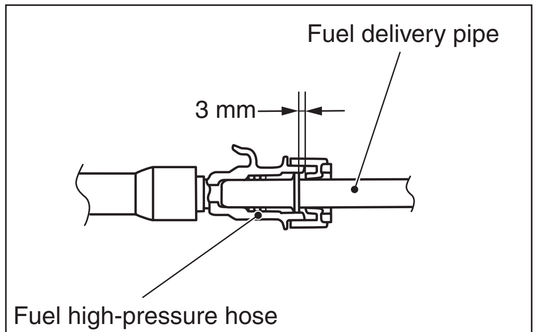

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1. Place the engine and transmission assembly on the cart below the lifted vehicle.
2. Lower the lift to the position where the mounting bolts of the engine mounting insulator and the transmission mounting insulator, and the self-locking nuts are installed.
3. Install the engine mounting insulator.
4. Tighten the new self-locking nuts of engine mounting insulator and transmission mounting insulator to the specified torque, and tighten the new mounting bolts of engine mounting insulator and transmission mounting insulator to the specified torque.

Tightening torque:
68 ± 7 N·m <Engine mounting insulator mounting bolts and nuts>
43 ± 4 N·m <Transmission mounting insulator mounting bolt and nuts>

>>B<< FUEL HIGH-PRESSURE HOSE INSTALLATION

⚠ CAUTION



AC208465AE

- **After connecting the fuel high-pressure hose, check that it has been securely installed by slightly pulling in the removal direction. At this time, also check that there is approximately 3-mm play.**
- **When applying the engine oil, make sure not to allow the engine oil to enter the fuel delivery pipe.**

Apply a small amount of the engine oil to the fuel delivery pipe, and then install the fuel high-pressure hose.

>>C<< INITIALISATION

When the engine-ECU is removed, initialise the electronic-controlled throttle valve system according to the following procedure after installing the engine-ECU.

Turn the ignition switch from "ON" position to "LOCK" (OFF) position, and then hold "LOCK" (OFF) position for approximately 10 seconds or more.

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Group TOC

REMOVAL AND INSTALLATION <CVT>

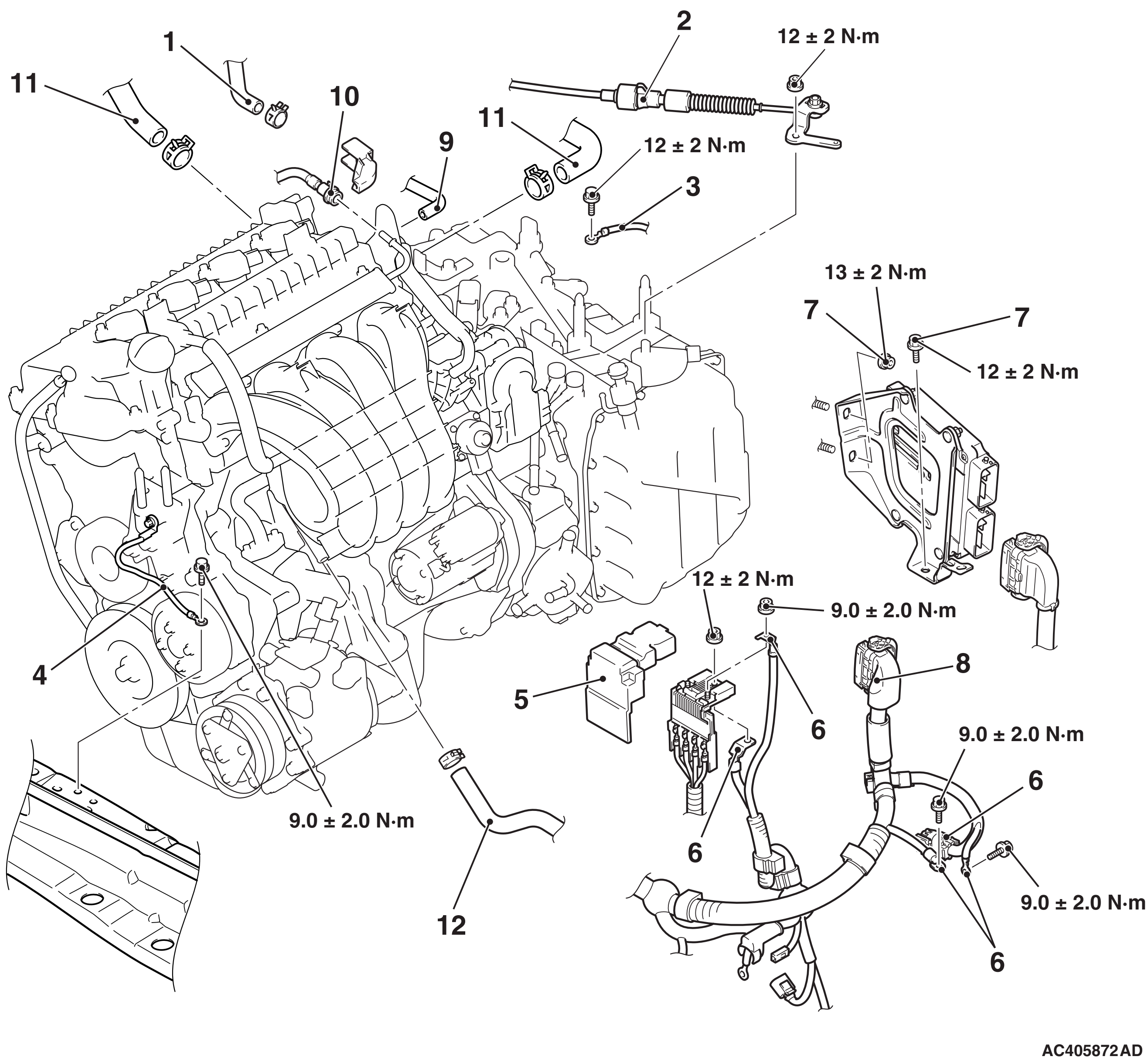
M1112001002953

⚠ CAUTION

When the engine assembly replacement is performed, use the M.U.T.-III to initialise the learning value (Refer to GROUP 00, Precautions Before Service – Initialisation Procedure for Learning Value in MPI Engine P.00-20).

Pre-removal Operation	Post-installation Operation
• Fuel Line Pressure Reduction [Refer to GROUP 13A, On-vehicle Service – Fuel Pump Connector Disconnection (How to Reduce Pressurized Fuel Lines) P.13A-357]. • Front Under Cover Panel Assembly Removal (Refer to GROUP 51, Front Bumper Assembly and Radiator Grille P.51-2). • Engine Room Side Under Cover Removal • Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-4). • Engine Oil Draining (Refer to GROUP 12, On-vehicle Service – Engine Oil Replacement P.12-3). • Transmission Fluid Draining [Refer to GROUP 23A, On-vehicle Service – Transmission Fluid (CVT Fluid) Replacement P.23A-133]. • Air Cleaner Assembly Removal (Refer to GROUP15, Air Cleaner P.15-5). • Battery and Battery Tray Removal • Alternator and Alternator Brace Removal (Refer to GROUP 16, Charging System – Alternator Assembly P.16-13). • Drive Shaft Removal (Refer to GROUP 26, Drive Shaft Assembly P.26-16). • Front Bumper Face Assembly Removal (Refer to GROUP 51, Front Bumper Assembly and Radiator Grille P.51-2). • Radiator Assembly Removal (Refer to GROUP 14, Radiator P.14-22). • Exhaust Manifold Removal (Refer to GROUP15, Exhaust Manifold P.15-14).	• Exhaust Manifold Installation (Refer to GROUP 15, Exhaust Manifold P.15-14). • Radiator Assembly Installation (Refer to GROUP 14, Radiator P.14-22). • Front Bumper Face Assembly Installation (Refer to GROUP 51, Front Bumper Assembly and Radiator Grille P.51-2). • Drive Shaft Installation (Refer to GROUP 26, Drive Shaft Assembly P.26-16). • Alternator and Alternator Brace Installation (Refer to GROUP 16, Charging System – Alternator Assembly P.16-13). • Battery and Battery Tray Installation • Air Cleaner Assembly Installation (Refer to GROUP 15, Air Cleaner P.15-5). • Transmission Fluid Refilling [Refer to GROUP 23A, On-vehicle Service – Transmission Fluid (CVT Fluid) Replacement P.23A-133]. • Engine Oil Refilling (Refer to GROUP12, On-vehicle Service – Engine Oil Replacement P.12-3). • Engine Coolant Refilling (Refer to GROUP 14 - On-vehicle Service – Engine Coolant Replacement P.14-4). • Drive Belt Tension Check and Adjustment (Refer to P.11A-6). • Engine Room Side Under Cover Installation • Front Under Cover Panel Assembly Installation (Refer to GROUP 51, Front Bumper Assembly and Radiator Grille P.51-2). • Fuel Leak Check

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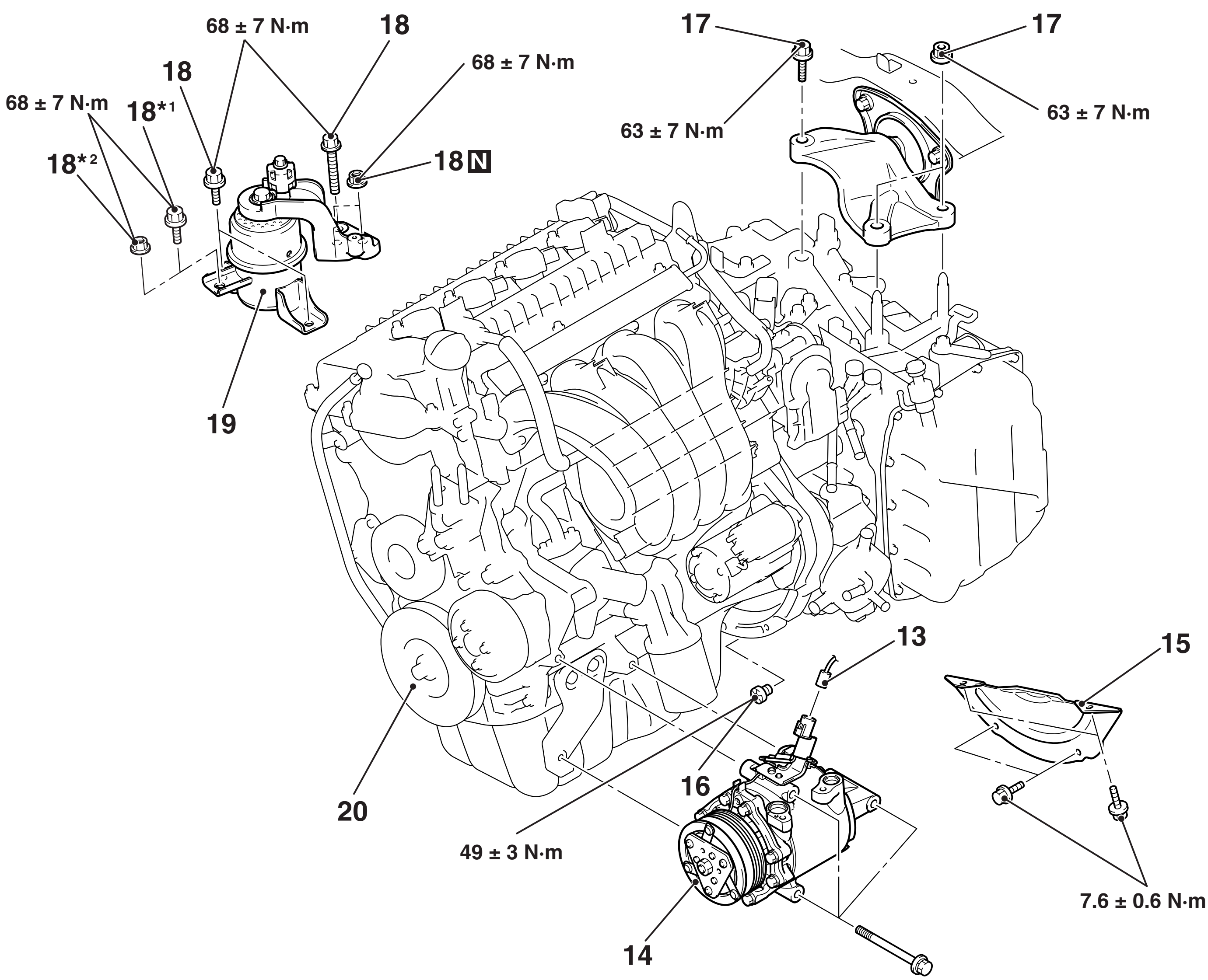
Removal steps

>>D<<	•	Initialisation <Installation only>
	1.	Brake booster vacuum hose connection
	2.	Transmission control cable connection
	3.	Earth connection
	4.	Earth cable connection
	5.	Fusible link box cover

Removal steps (Continued)

		6.	Control harness connection
		7.	Engine-CVT-ECU mounting bolt and nut
		8.	Engine-CVT-ECU connector
		9.	Purge solenoid hose connection
<<A>>	>>C<<	10.	Fuel high-pressure hose connection
		11.	Heater hose connection
		12.	Water hose connection

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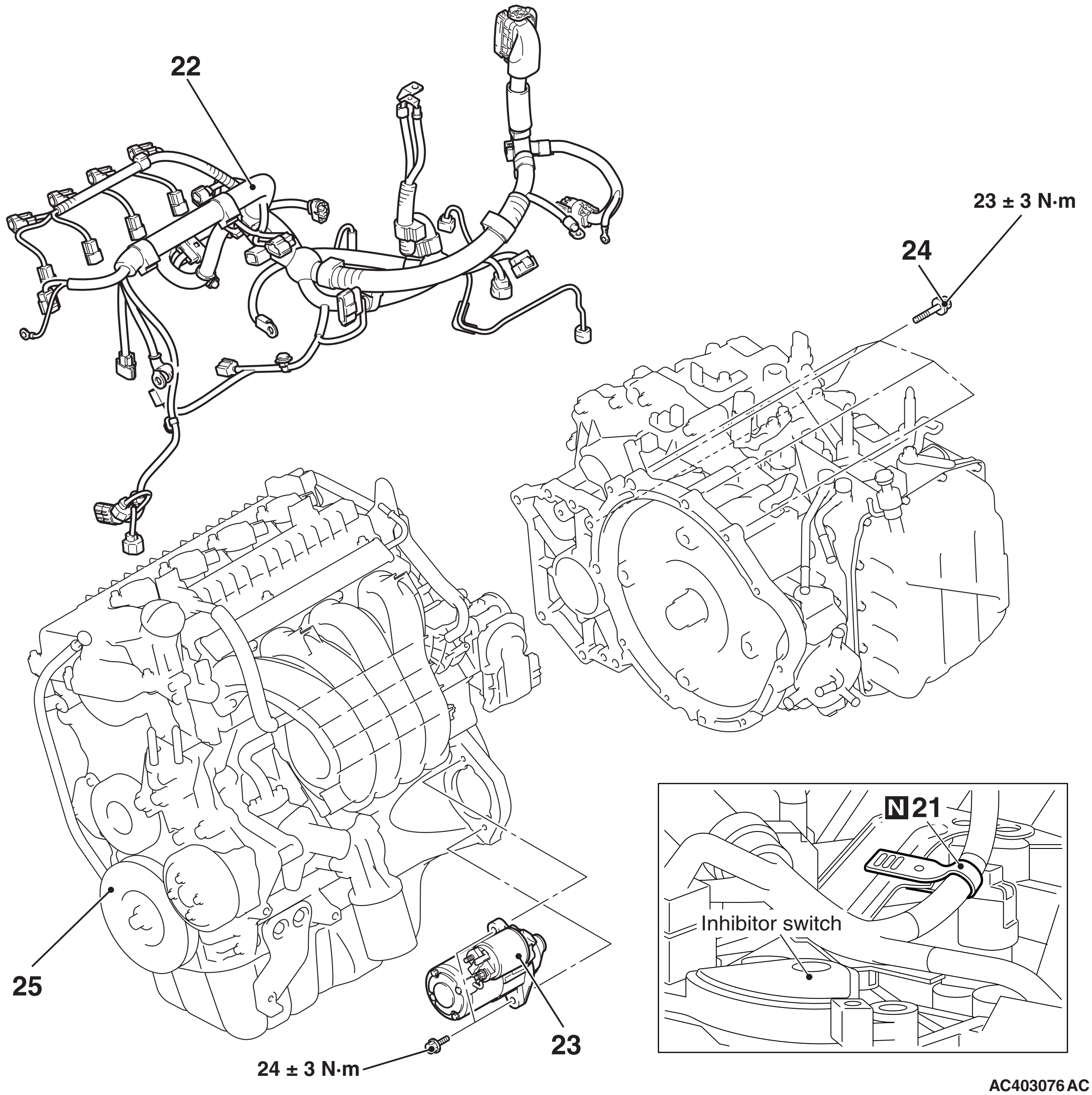


NOTE
*1 : Up to Feb. 2006 models
*2 : From Mar. 2006 models

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			Removal steps
		13.	A/C compressor connector
<<B>>		14.	A/C compressor and magnet clutch assembly
		15.	Bell housing cover
<<C>>		16.	Torque converter and drive plate connecting bolt
		•	Engine roll stopper rod assembly (Refer to GROUP 32, Engine Roll Stopper Rod Assembly P.32-11).

			Removal steps (Continued)
<<D>>	>>B<<	17.	Transmission mounting insulator connecting bolt and nut
<<D>>	>>B<<	18.	Engine mounting insulator connecting bolt and nut
<<D>>	>>B<<	19.	Engine mounting insulator
<<E>>	>>B<<	20.	Engine and transmission assembly



Removal steps

21. Cable band
22. Control harness
23. Starter assembly

Removal steps (Continued)

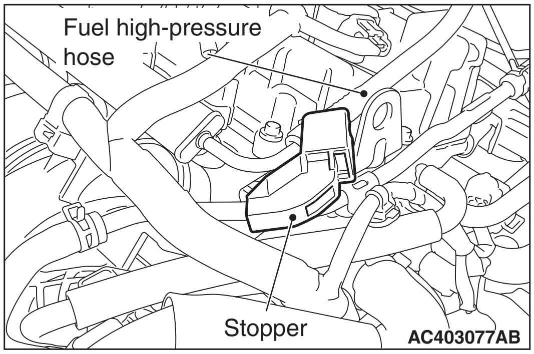
<<F>> 24. Transmission connecting bolt

<<F>> >>A<< 25. Engine assembly

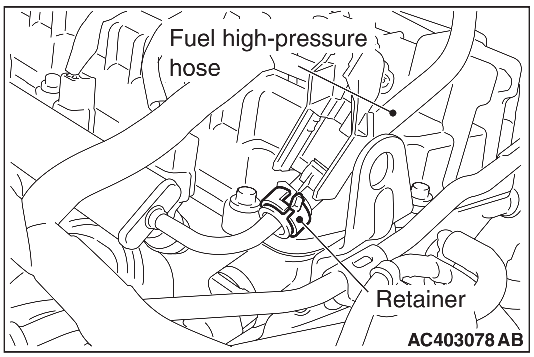
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REMOVAL SERVICE POINTS

<<A>> FUEL HIGH-PRESSURE HOSE REMOVAL



1. Remove the stopper.



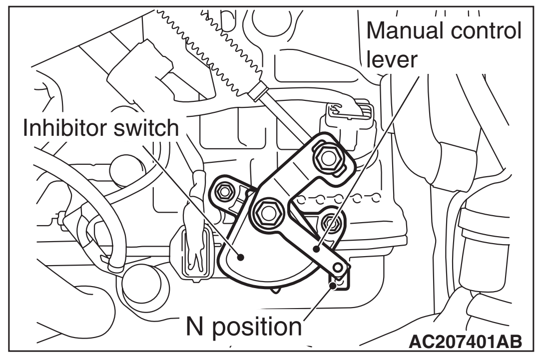
2. Raise the retainer, and pull out the fuel high-pressure hose.

   NOTE: If the retainer comes off, install it securely after pulling out the fuel high-pressure hose.

<<B>> A/C COMPRESSOR AND MAGNET CLUTCH ASSEMBLY REMOVAL

1. With the hose installed, remove the A/C compressor and magnet clutch assembly from the cylinder block.
2. Secure the removed A/C compressor and magnet clutch assembly with cord or rope at a position where they will not interfere with the removal of the engine and transmission assembly.

<<C>> TORQUE CONVERTER AND DRIVE PLATE CONNECTING BOLT REMOVAL

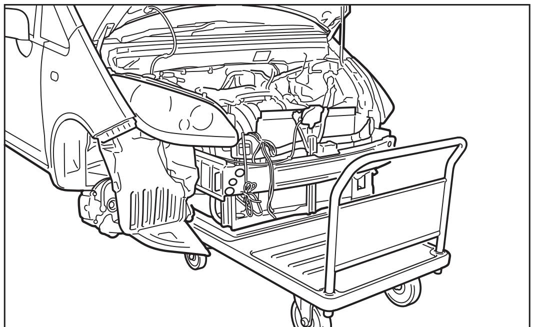


1. Set the transmission in N (neutral) and remove each coupling bolt while turning the crankshaft.

   NOTE: The N (Neutral) state of the transmission can be checked with the position of the manual control lever.
2. Push in the torque converter into the transmission side and make a point to ensure that the torque converter does not remain on the engine side.

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Group TOC

<<D>> TRANSMISSION MOUNTING INSULATOR CONNECTING BOLT AND NUT/ENGINE MOUNTING INSULATOR CONNECTING BOLT AND NUT/ENGINE MOUNTING INSULATOR REMOVAL



AC403079

1. Place a cart below the engine and transmission assembly.
2. Lower the lift to the position where the weight of the engine and transmission assembly is not applied to the transmission mounting insulator and the engine mounting insulator.
3. Remove the self-locking nuts, transmission mounting insulator mounting bolt and engine mounting insulator mounting bolts.

⚠ CAUTION

Because the engine assembly is installed with tilted toward the rear side, support the engine and transmission assembly after removing the engine mounting insulator.

4. Remove the engine mounting insulator.

<<E>> ENGINE AND TRANSMISSION ASSEMBLY REMOVAL

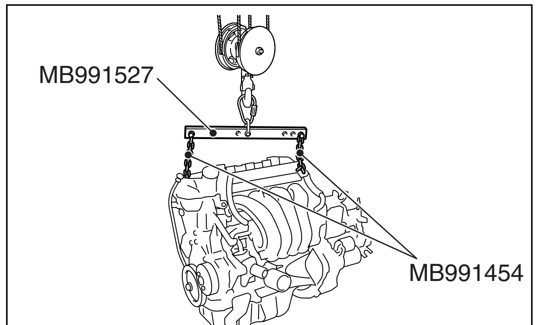
1. Confirm that the cable, the hose, and the harness connector are all disconnected.

⚠ CAUTION

Do not bend the fuel high-pressure hose.

2. Raise the body slowly with a lift, and remove the engine and transmission assembly.

<<F>> TRANSMISSION CONNECTING BOLT/ENGINE ASSEMBLY REMOVAL



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1. Install the chain of special tool engine hanger balancer (MB991454) and special tool engine hanger (MB991527), and set the chain block.
2. Remove the transmission assembly connecting bolts.

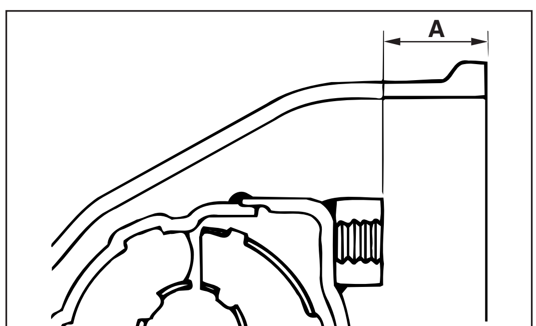
⚠ CAUTION

- **When lifting the engine assembly, operate with care not to lift the transmission assembly.**
- **When working, make sure that the torque converter will not be detached with the engine.**

3. Lift the engine assembly slowly using the chain block, and remove the transmission assembly when the engine assembly is lifted a little.

INSTALLATION SERVICE POINTS

>>A<< ENGINE ASSEMBLY INSTALLATION

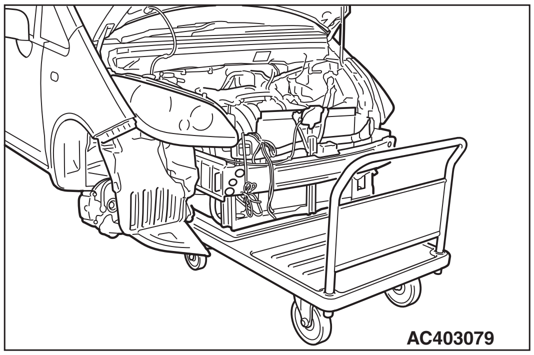


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Before installing the engine assembly, ensure that the dimension A from the torque converter housing end to the front end of the torque converter mounting boss shall be minimum 12.2 mm and the torque converter is securely installed.

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>>B<< ENGINE AND TRANSMISSION ASSEMBLY/ENGINE MOUNTING INSULATOR/ENGINE MOUNTING INSULATOR CONNECTING BOLT AND NUT/TRANSMISSION MOUNTING INSULATOR CONNECTING BOLT AND NUT INSTALLATION

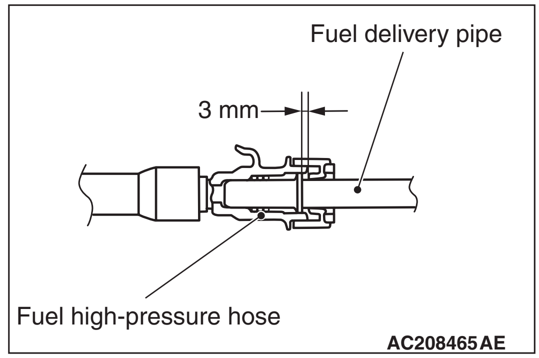


1. Place the engine and transmission assembly on the cart below the lifted vehicle.
2. Lower the lift to the position where the mounting bolts of the engine mounting insulator and the transmission mounting insulator, and the self-locking nuts are installed.
3. Install the engine mounting insulator.
4. Tighten the new self-locking nuts of engine mounting insulator and transmission mounting insulator to the specified torque, and tighten the new mounting bolts of engine mounting insulator and transmission mounting insulator to the specified torque.

Tightening torque:
68 ± 7 N·m <Engine mounting insulator mounting bolts and self locking nuts>
63 ± 7 N·m <Transmission mounting insulator mounting bolt and self locking nuts>

>>C<< FUEL HIGH-PRESSURE HOSE INSTALLATION

⚠ CAUTION



- **After connecting the fuel high-pressure hose, check that it has been securely installed by slightly pulling in the removal direction. At this time, also check that there is approximately 3-mm play.**
- **When applying the engine oil, make sure not to allow the engine oil to enter the fuel delivery pipe.**

Apply a small amount of the engine oil to the fuel delivery pipe, and then install the fuel high-pressure hose.

>>D<< INITIALISATION

When the engine-CVT-ECU is removed, initialise the electronic-controlled throttle valve system according to the following procedure after installing the engine-CVT-ECU.

Turn the ignition switch from "ON" position to "LOCK" (OFF) position, and then hold "LOCK" (OFF) position for approximately 10 seconds or more.